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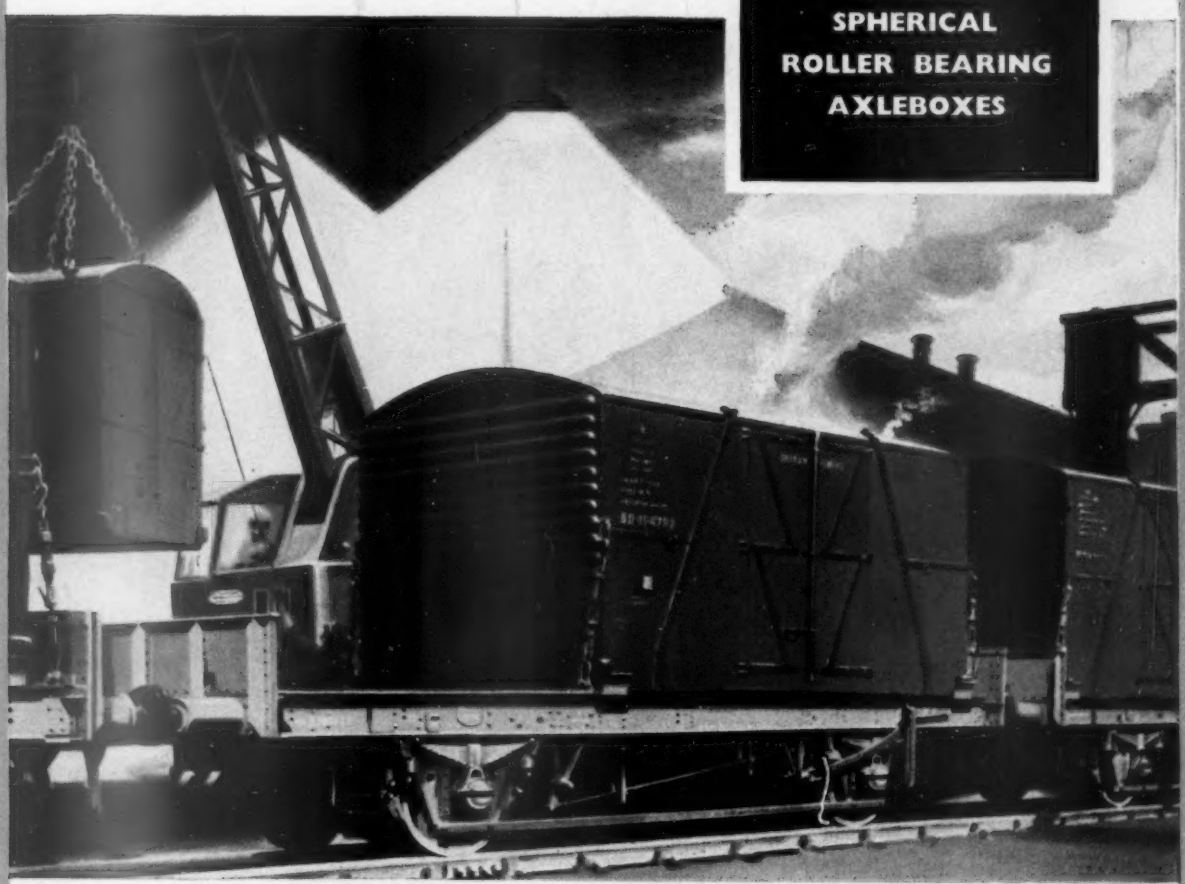

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The new Pullman Cars are also being used on 'The Yorkshire Pullman' and 'The Tees-Tyne Pullman.'

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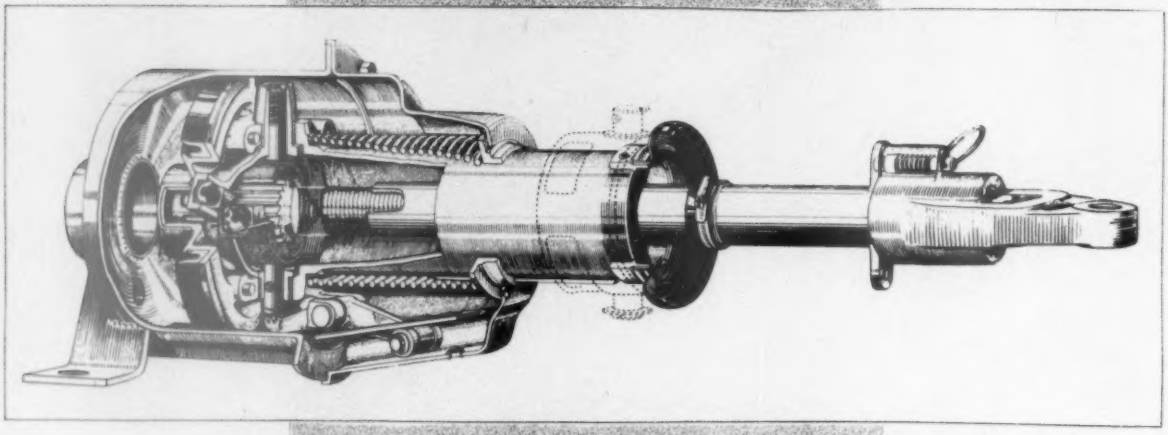

Installation drawings and descriptive literature on request.
Please ask for Pamphlet A.545/5

Westinghouse Brake and Signal Co. Ltd., 82, York Way, London, N.1

Westinghouse Brake (Australasia) Pty. Ltd., Concord West, N.S.W. Saxby & Farmer (India) Private Ltd., Calcutta Westinghouse Brake & Signal Co. S.A. (Pty.) Ltd., Johannesburg. *Agents—Bellamy and Lambie, Johannesburg*

Dependable G-E diesel-electrics chosen to haul ore through African jungle

Seven General Electric universal model diesel-electric locomotives will soon be operating in the tropical jungles of central Africa. These 1330-hp locomotives were ordered by the French Mining Company COMILOG (Compagnie Miniere de l'Ogooue) to haul thousands of tons of manganese ore daily to a coast port 300 miles away.

From the mine site located along the Ogooue River near Franceville in the Gabon Republic, the ore will be hauled 50 miles by cableway to the railhead at M'Binda. There it will be loaded into ore cars for the 300-mile rail trip to the port of Pointe Noire.

General Electric diesel-electric locomotives were chosen to haul heavy ore trains in the extreme African climate for these reasons:

DEPENDABILITY In tropical Africa where COMILOG's locomotives will be operating, the temperature ranges up to 96° F. and the humidity reaches 100%. Annual rainfall averages 85 inches, with tornados and violent winds common from October through May. Here a locomotive meets a severe test of reliability—and G-E diesel-electrics have already proven themselves in similar conditions.

EFFICIENCY Interchangeable electrical controls and equipment proven in millions of miles of world-wide service assure maximum use of engine horsepower, ease of operation, and outstanding performance from a locomotive designed to take hard working conditions.

ECONOMY Heavy-duty 4-cycle diesel engine, specifically designed for low fuel consumption, reliability, and long life has established a standard for operating savings and low maintenance on the world's railways.

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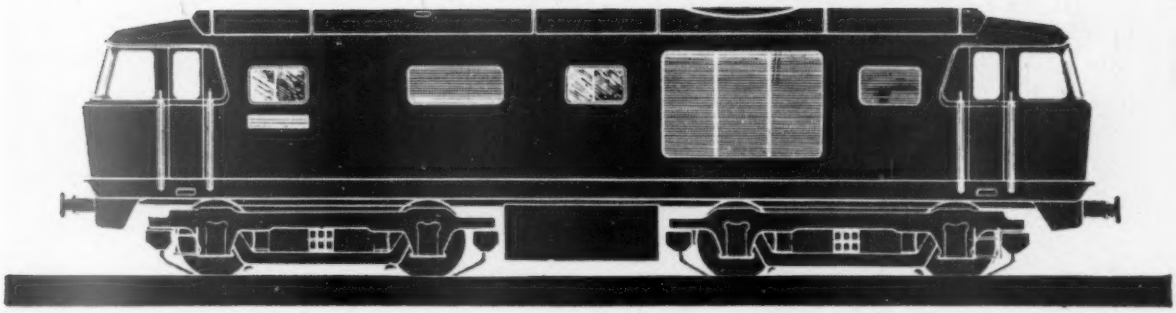
RAIL POWER BY BRISTOL SIDDELEY

New order for 50 Bristol Siddeley Maybach diesel engines brings British Railways total to 286



This latest order for 50 Maybach* diesel traction engines, for use in the new Beyer Peacock (Hymek) Ltd Type 3 locomotives, now brings the total orders placed with Bristol Siddeley for British Railways Western Region to 286. These large orders are a striking confirmation of British Railways complete confidence in Maybach high-speed diesel engines.

Maybach Diesels Already In Operation
There are already a large number of Maybach engines in service. Two Maybach Type MD 650 high-speed diesel engines, which develop a total of 2,200 hp, power the D 800 class of locomotive built at the British Railways Swindon works. The famous "Bristolian" express, for example, is hauled by one of these locomotives.

Bristol Siddeley After-Sales Service
Maybach diesel engines have built for themselves, all over the world, an unsurpassed reputation as the most efficient and reliable diesel engine of today. This engine, backed by the fast and efficient Bristol Siddeley after-sales and spares service, offers the most satisfactory solution to all rail traction requirements.

For further information, please write to: Maybach Sales Manager, Power Division, Bristol Siddeley Engines Limited, PO Box 17, Coventry, England.

**Manufactured in the U.K. under licence from Maybach-Motorenbau GmbH.*

BRISTOL SIDDELEY ENGINES LIMITED

One of thirty-five 2,000-h.p. main-line diesel-electric locomotives supplied to the Rhodesian Railways by The English Electric Company Limited.

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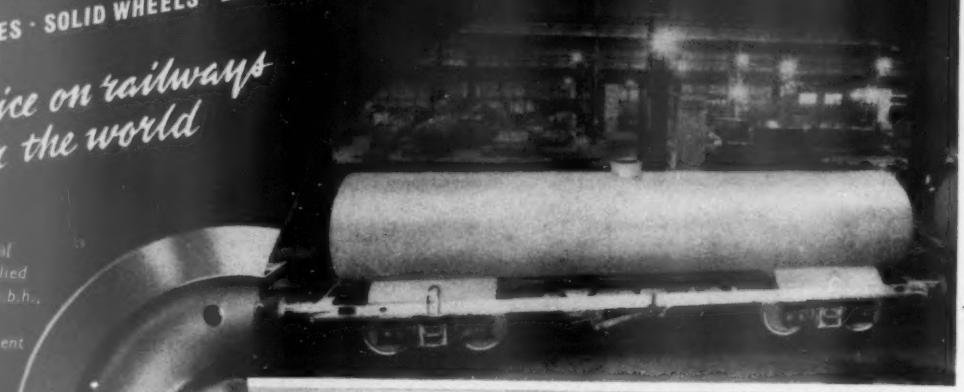
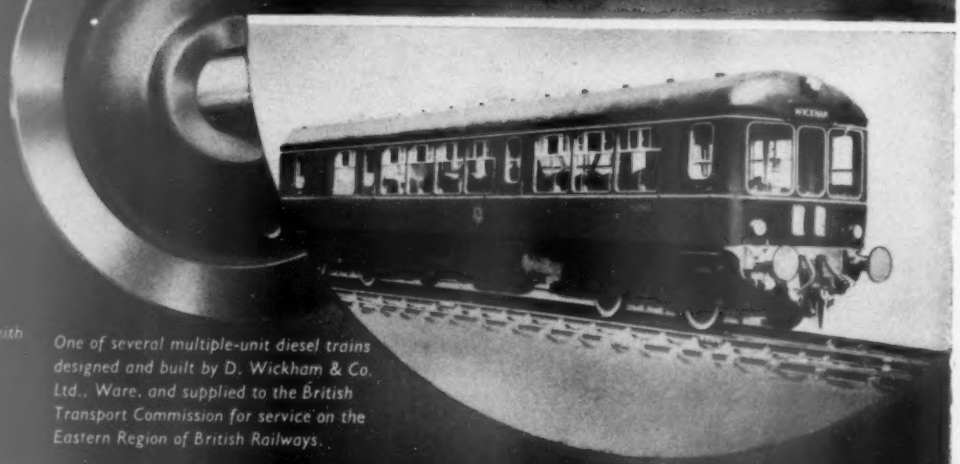


One of a number of tank wagons supplied by Rax-Werk G.m.b.h., Austria, to the Pakistan Government Railways.

B B



All the vehicles shown are fitted with Baker-Bessemer wheels and axles.

One of several multiple-unit diesel trains designed and built by D. Wickham & Co. Ltd., Ware, and supplied to the British Transport Commission for service on the Eastern Region of British Railways.

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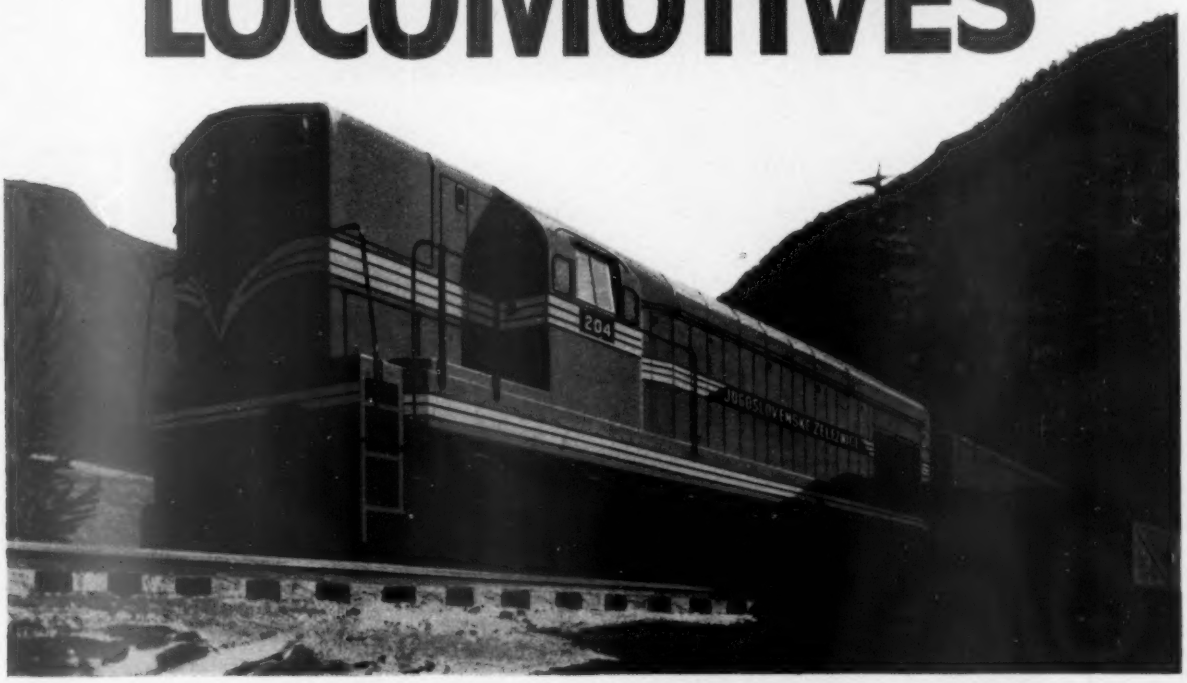
Yugoslav National Railways Order **57** *more*

GENERAL MOTORS LOCOMOTIVES



The successful performance of 20 General Motors Model G16 Diesel-Electric locomotives on Yugoslav Railways, hauling trains twice as long as the steam locomotives they replaced, has led to the purchase of 57 more of these 1950-H.P. units.

Fourteen will be used to complete dieselization of the Split-Knin line, connecting central Yugoslavia with the Adriatic Sea. The others, geared for a top speed of 120 Km./Hr., will be used to increase speed and tonnage of trains on the Ljubljana-Belgrade-Nis line, as the international route to Athens and Istanbul.

Repeat orders from satisfied customers are the reason why General Motors locomotives outnumber all other Diesels on railways of the world.

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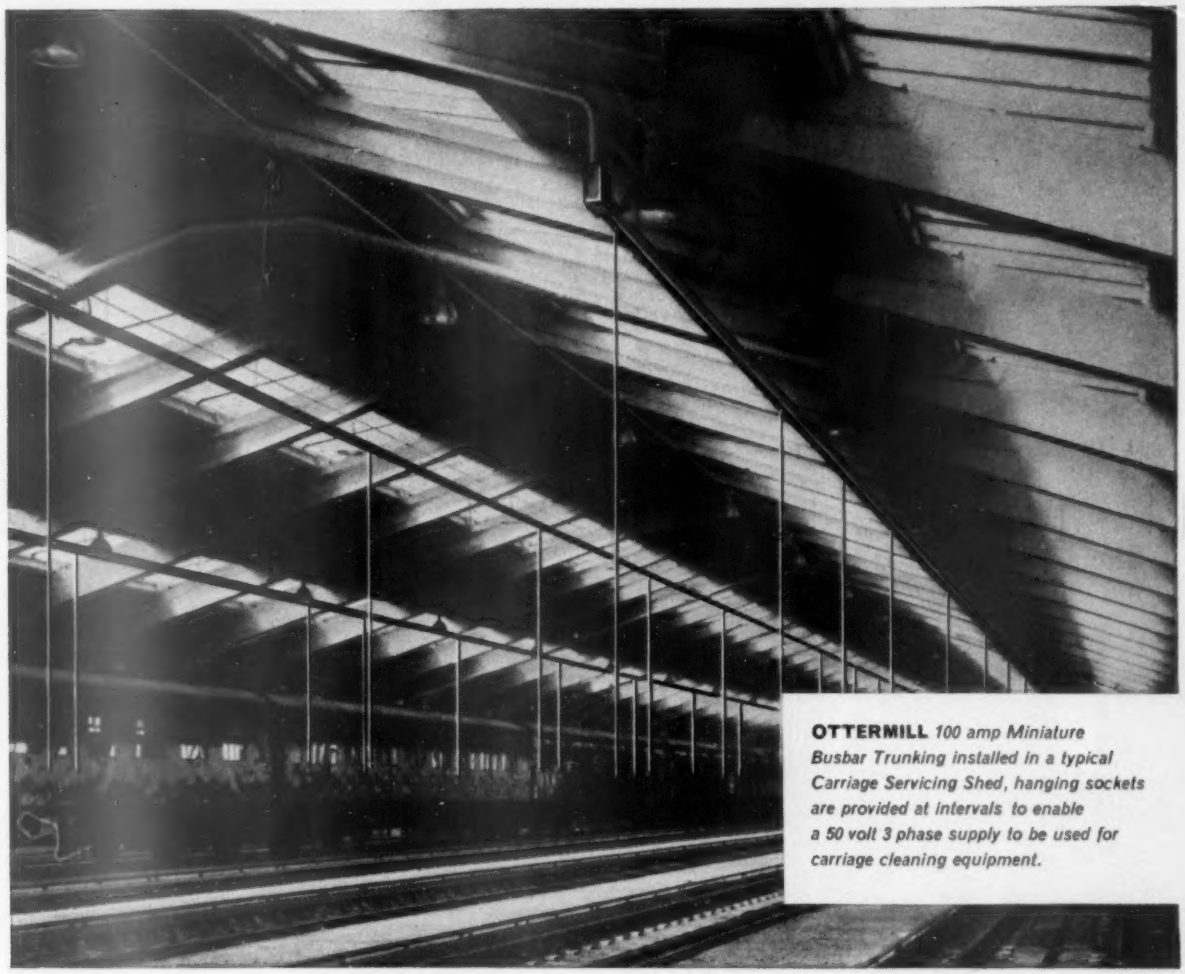

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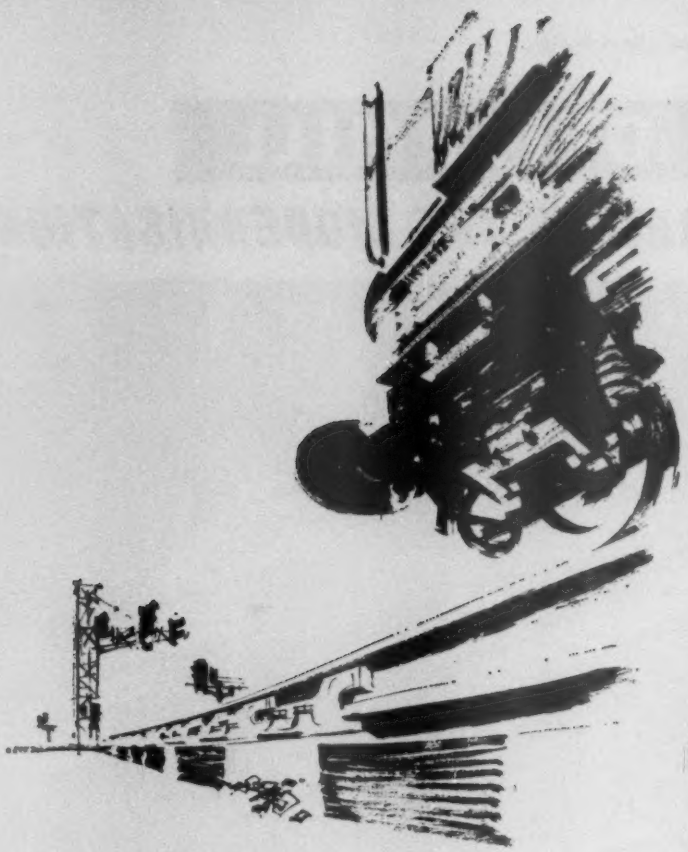

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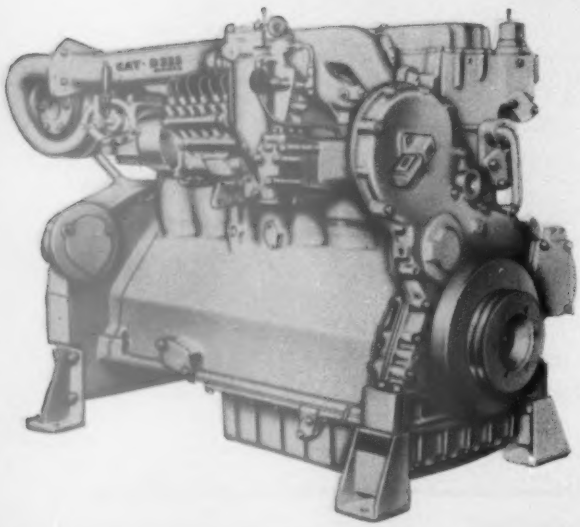

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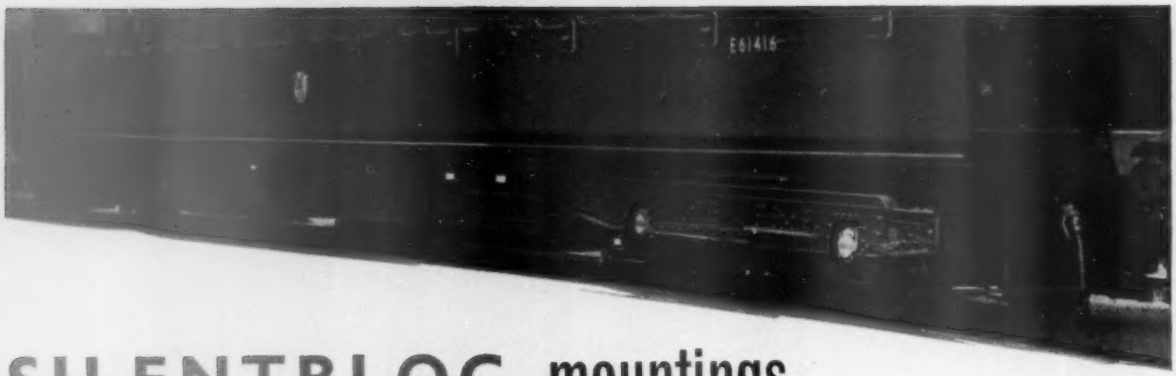
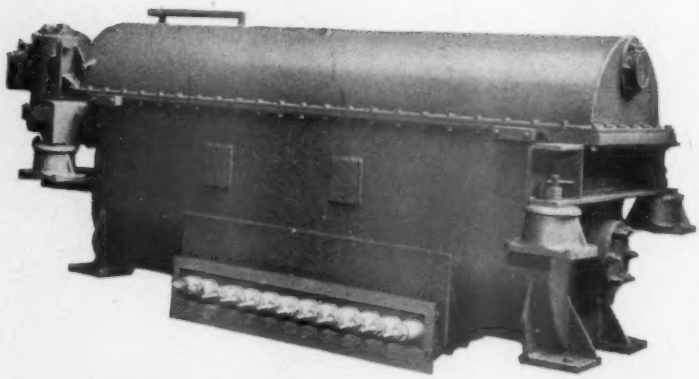


SILENTBLOC mountings in new B.R. electric stock

The multi-unit motor coach illustrated is one of a group of 71 such units built at York and Doncaster with electrical equipment by the General Electric Company Ltd.

The G.E.C. 1,000 kVA transformer and two reactors (as shown here) are carried on Silentbloc anti-vibration mountings. These motor coaches provide the power for 3 or 4 coach multiple-unit trains on the Eastern Region Suburban lines.



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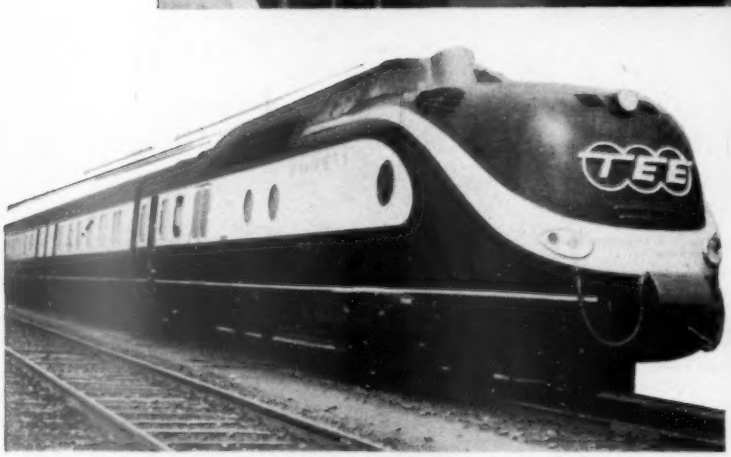
TRAVELLING COMFORT IN MODERN EXPRESS TRAINS



The present standard of comfort makes travelling in the modern express trains a special pleasure. It is, above all, the dust-free, temperature-controlled air that gives travellers great ease. This comfort is made possible by air-conditioning equipment running through the whole train and hidden from the eye—a marvel of technical development.

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Among other overseas railways the Iranian State Railway for their modernization programme have equipped all 1st and 2nd class passenger and dining cars with the **Jettair** system. The saloon train of H.M. the Shah, also, is being equipped with the **Luwa** system.

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Two Caterpillar 955 Traxcavators bulldozing ballast

Side Dump bucket of Caterpillar 955 Traxcavator in operation.

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Use of these mechanised techniques substantially reduced the time normally taken on operations of this kind.

All these machines were supplied by Bowmaker (Plant) Limited.

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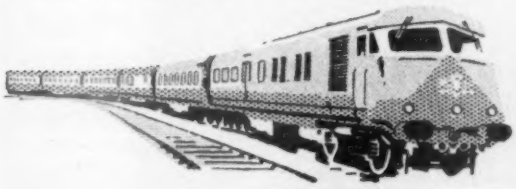

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. . . The London Commuter knows when he's on to a good thing but as he sits back little thought is spared for the Mirrlees diesel which gets him in on-time. Now, in many parts of British Railways, Eastern Region the story is the same—punctuality and reliability—thanks to Mirrlees diesels.

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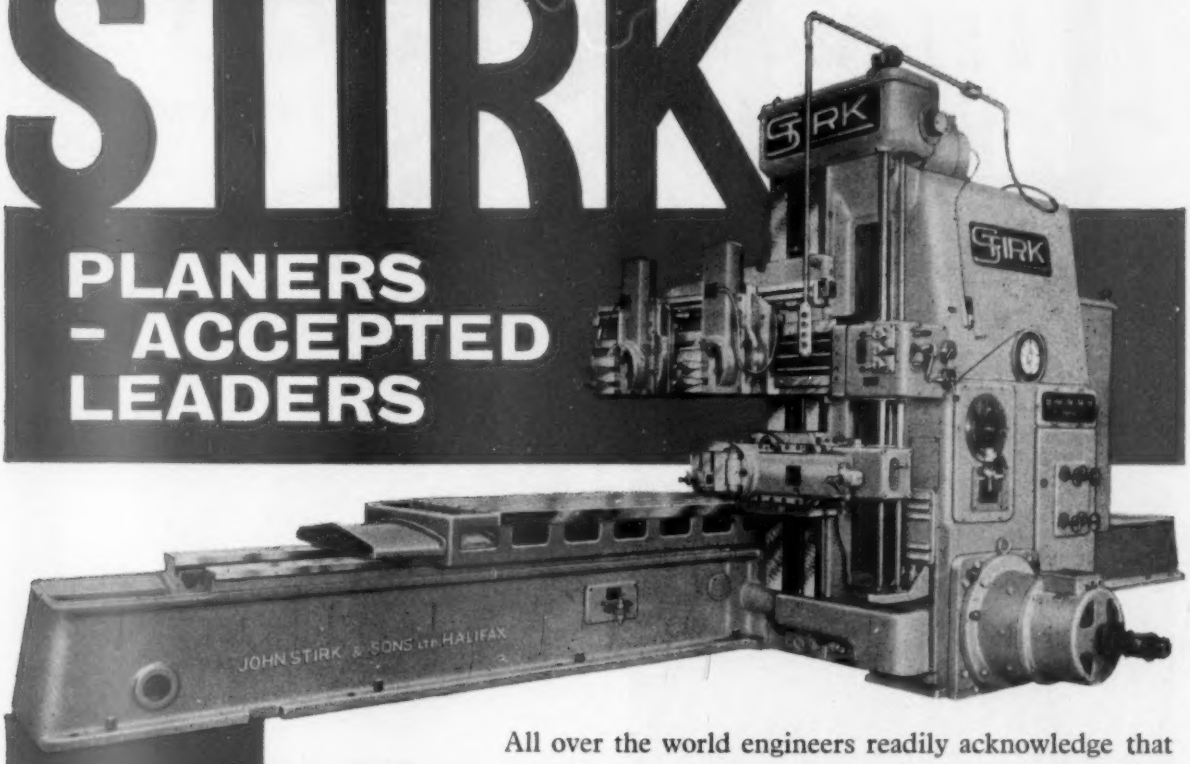

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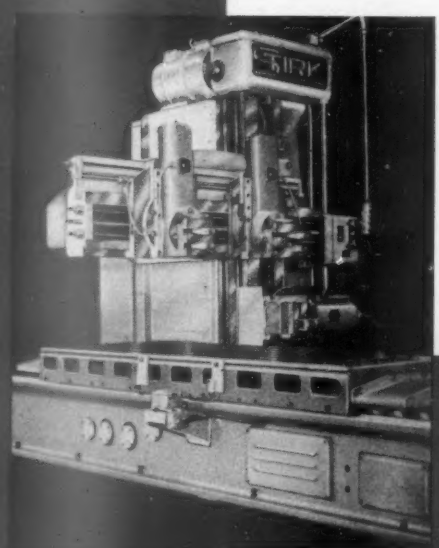

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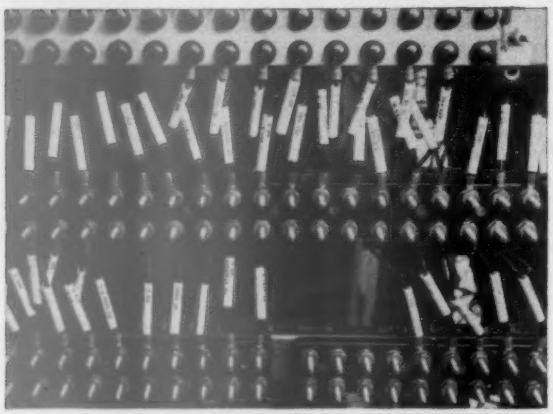
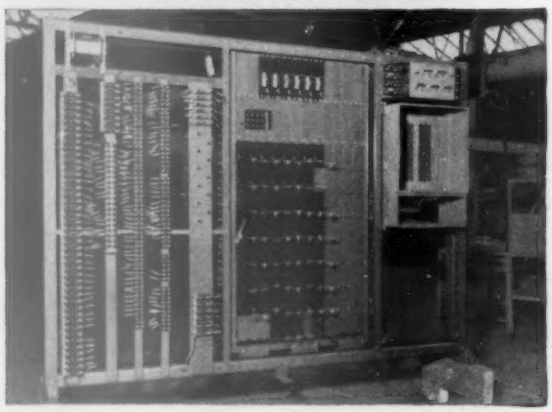
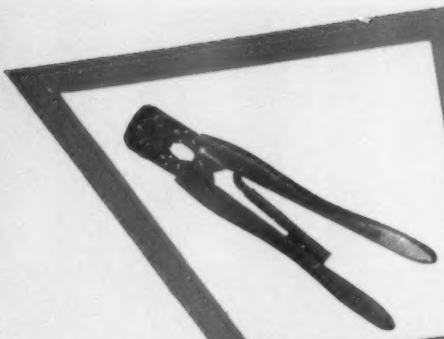


Close up showing *Plastibond Terminals.



Relay rack for a C.T.C. system



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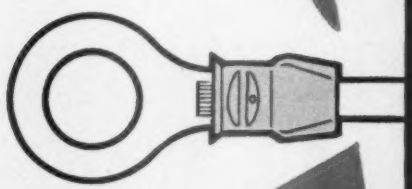

*Plastibond Terminal

. . . to the end

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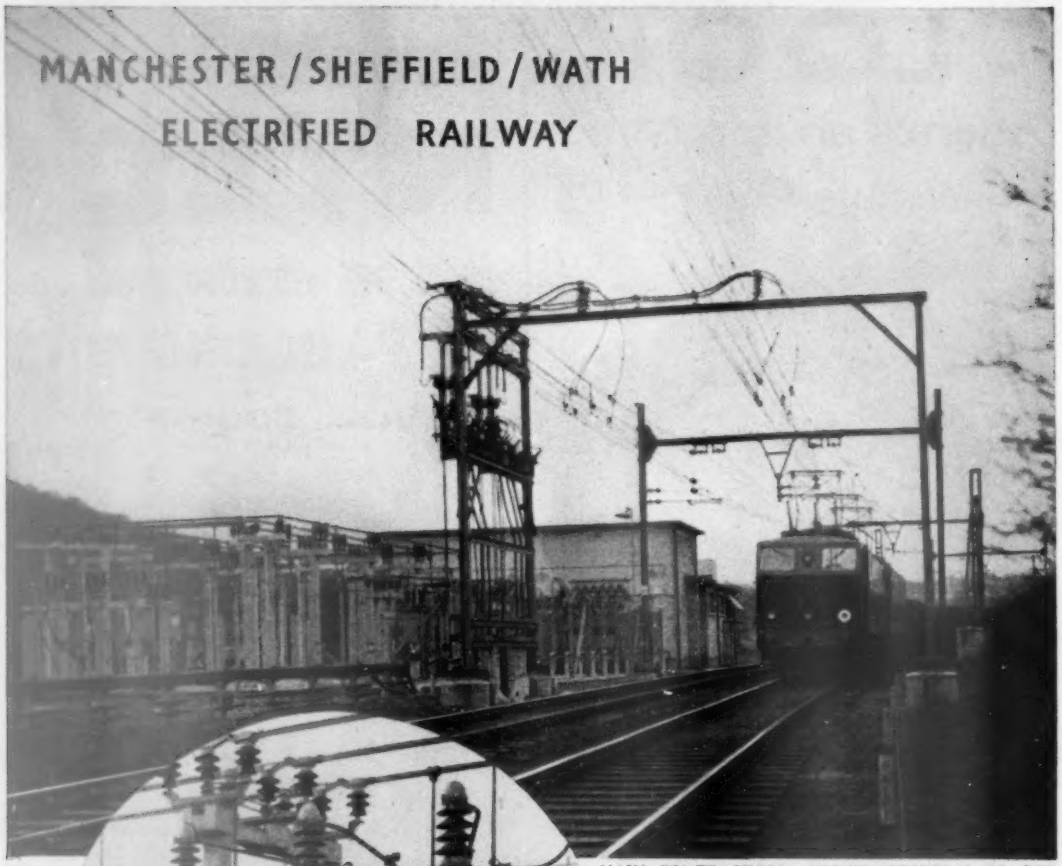

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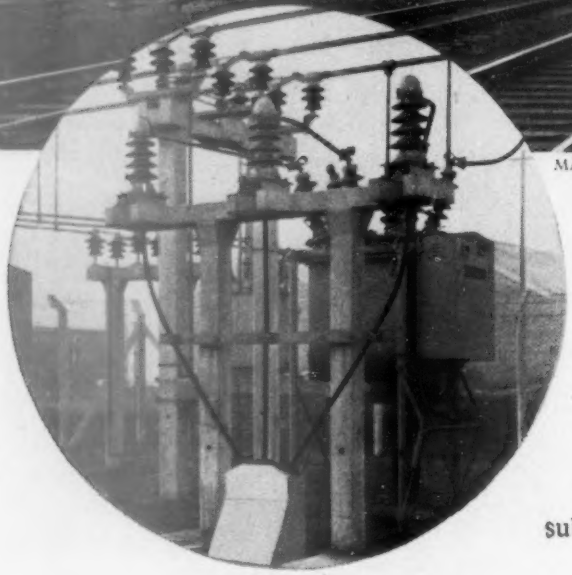

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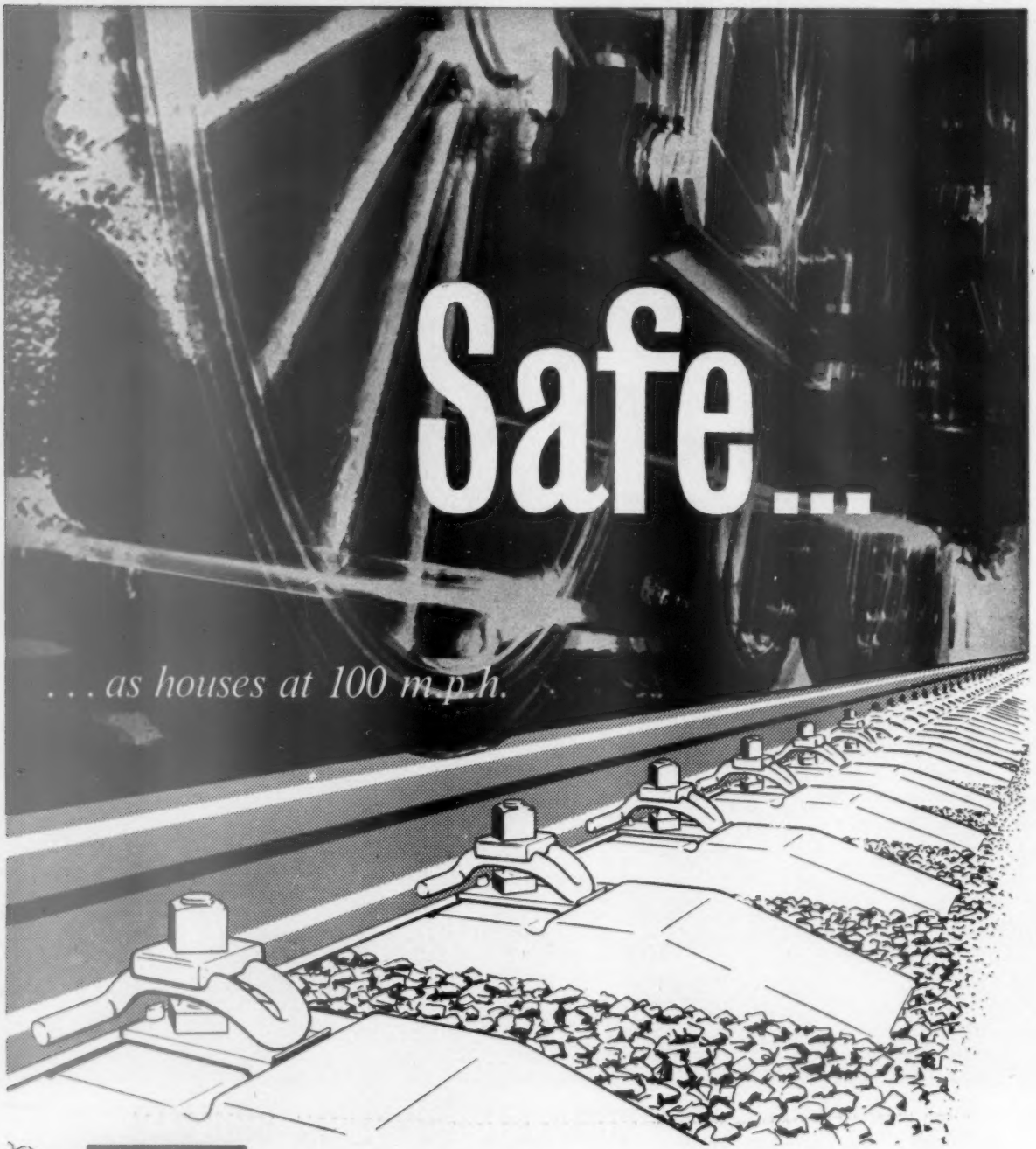

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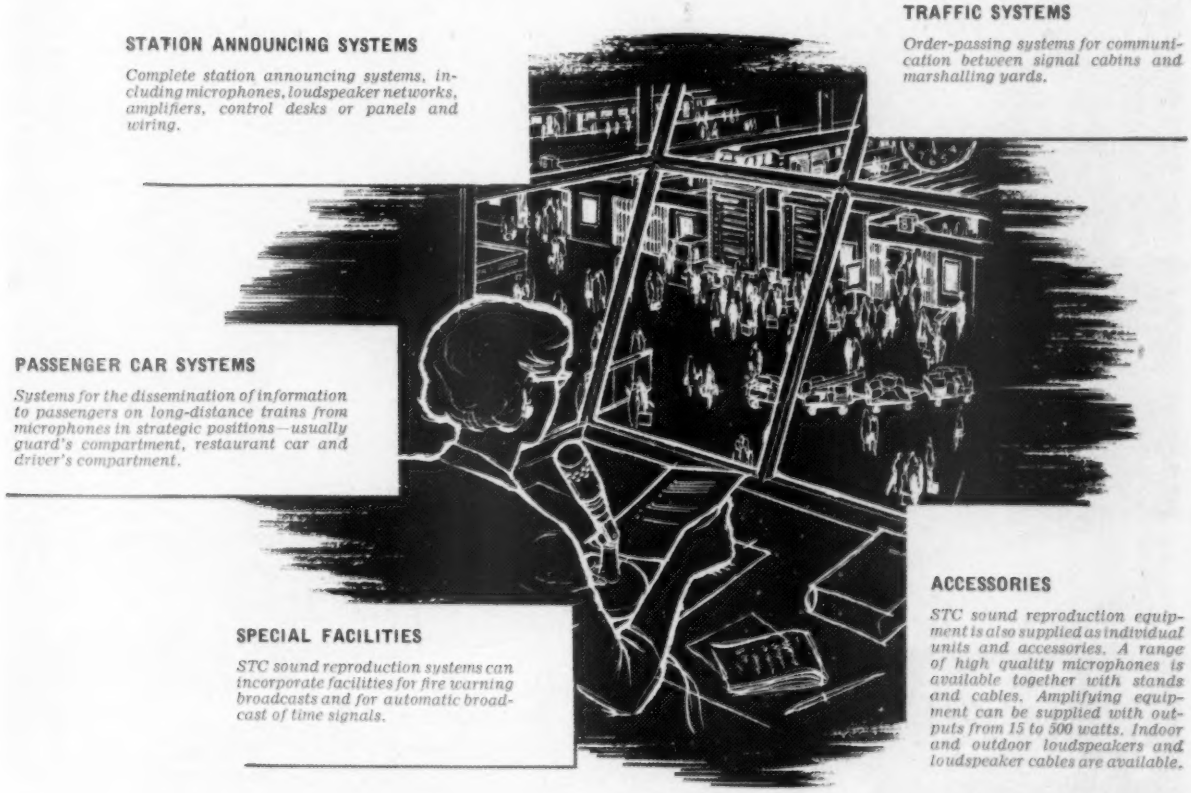

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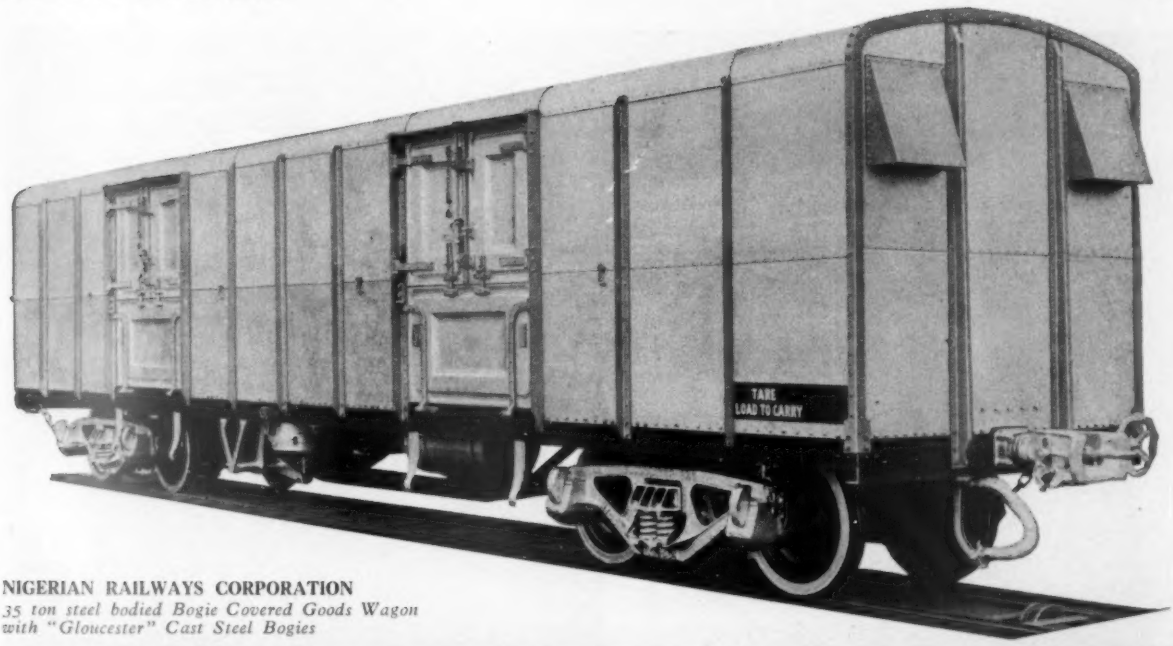

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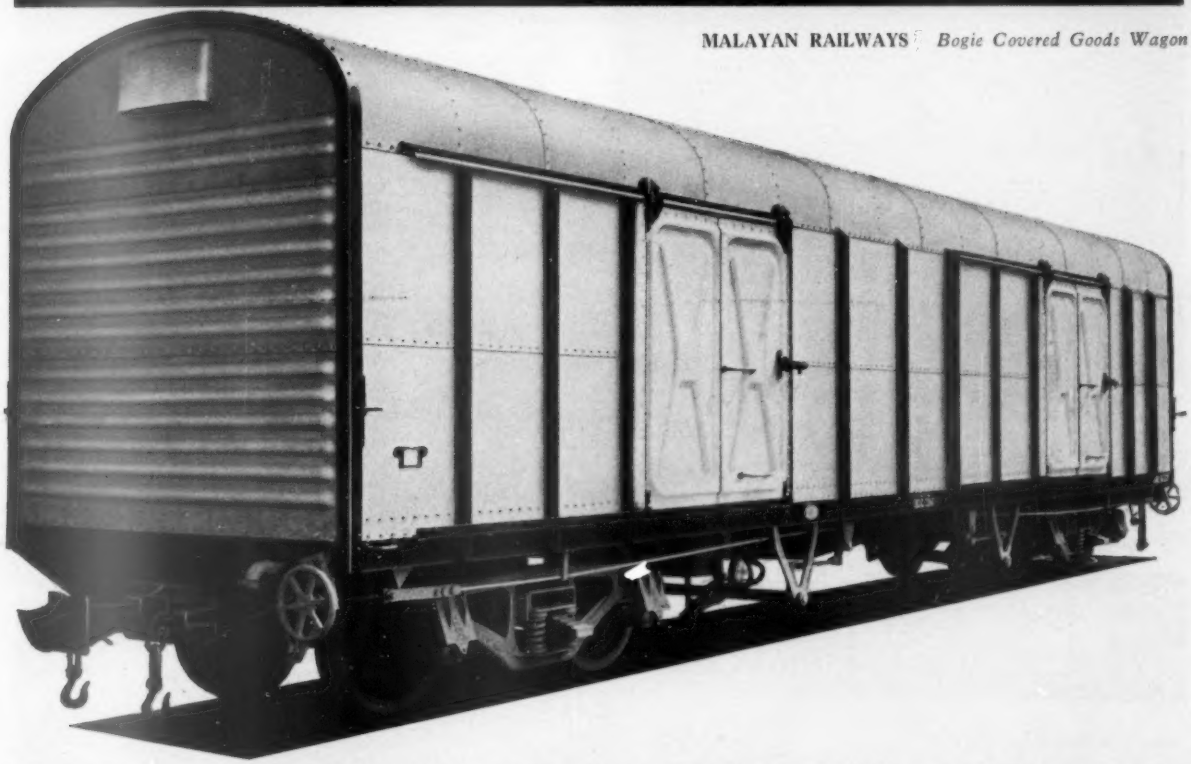

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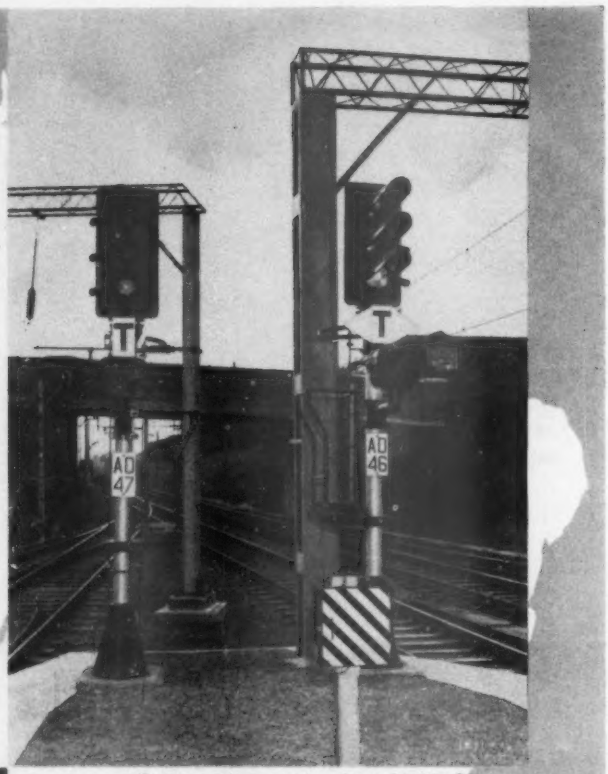
RE-SIGNALLING FOR SCOTTISH REGION

Airdrie to Kelvinhaugh Section of North Clyde Electrification project

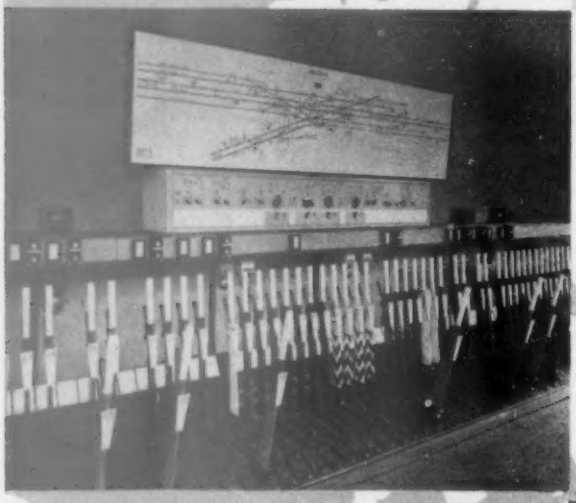
Introduction of colour light signalling
Elimination of 11 mechanical boxes
Two new electro-mechanical boxes
10 boxes re-equipped



Starter and shunt signals at Airdrie Station.

The Airdrie to Kelvinhaugh Re-Signalling Scheme has proved extremely successful since it was officially opened on November 5th, 1960. This signalling contract for S.G.E. involved 16 miles of double track, including the Springburn and Bridgeton Cross Branches. 350 track circuits, 50 motor operated points and 120 colour light signals were installed.

The system is controlled by switch panels in 10 rehabilitated mechanical boxes and 2 new electro-mechanical boxes, dispensing with 11 mechanical signal boxes.



Hybrid control of signals and points at Bellgrove signal box.

SGE SIGNALS

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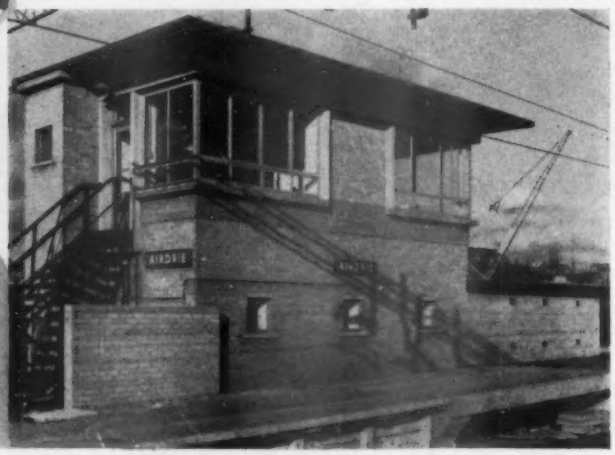

Airdrie signal box.

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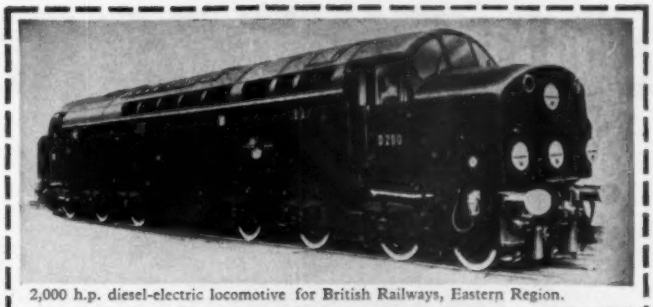
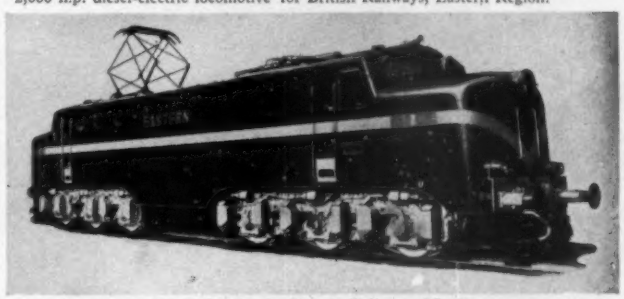
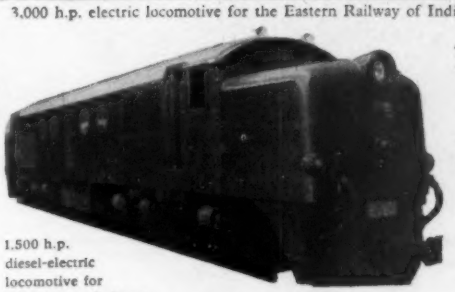


2,000 h.p. diesel-electric locomotive for British Railways, Eastern Region.

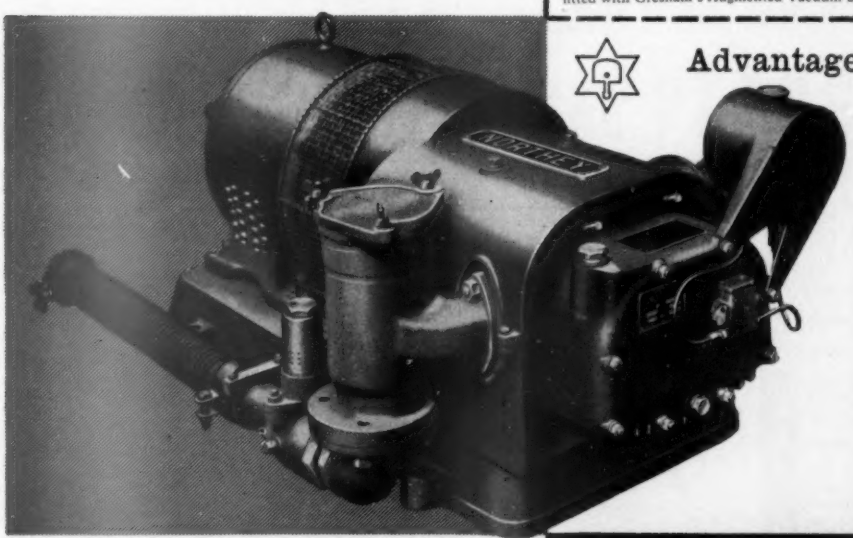


3,000 h.p. electric locomotive for the Eastern Railway of India.



1,500 h.p. diesel-electric locomotive for the Malayan Railway, fitted with Gresham's Augmented Vacuum Brake System for locomotive braking.

Acknowledgments to The English Electric Company Ltd; British Railways, Eastern Region; Eastern Railway of India and Malayan State Railway.



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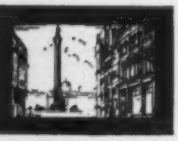

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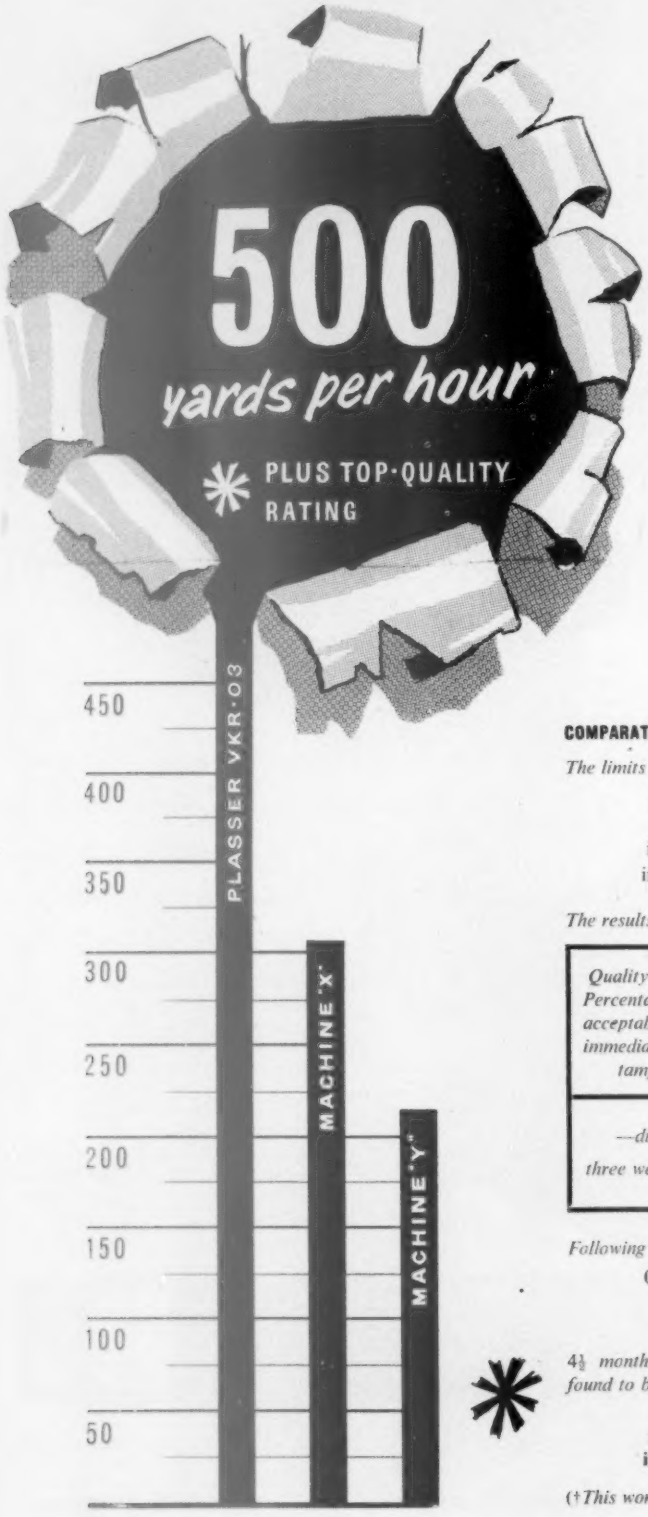


Remarkable results from Board of Trade Test carried out last May on three different manufacturers' normal production models on-track tamping machines. The results proved conclusively that the PLASSER VKR-03 is far superior to its competitors, both in speed and quality of work.

The test was carried out on a Class 'A' track average speed 75/80 m.p.h. 95 lb. B.H. material, 60′ rails, timber sleepers, on a compounded curve 62-85 chains radius, having cants of 3″ and 2″ respectively.

COMPARATIVE TESTS OF ON-TRACK BALLAST TAMPING MACHINES

The limits laid down were as follows:

i. For longitudinal level—Rate of change not to exceed $\frac{3}{16}$″ in 15′ 0″.
ii. For cross level—Variation not to exceed $\pm\frac{1}{8}$″.
iii. For voids—Not to exceed $\frac{1}{8}$″.

The results obtained were:

		Machine 'X'	*Machine 'Y'*	*PLASSER VKR-03*
Quality of work Percentage inside *acceptable limits, immediately after tamping.*	*Longl. Level*	77½	77	91
	Cross Level	28	59	77
	Voids	92	93	98
—*ditto*— *three weeks later*	*Longl. Level*	78	77	93
	Cross Level	8	41	45
	Voids	95	87½	98

Following the second set of measurements it was found:

(1) The cross level errors *outside* **the acceptable limits on the Plasser length were reasonably constant and of the order of $\frac{3}{16}$″ to $\frac{1}{4}$″.**

4½ months after the trials the following measured shovel packing was found to be necessary:

i. Machine 'X' 95% of the test length was re-worked.
ii. Machine 'Y' 83% of the test length was re-worked.
iii. PLASSER VKR-03 6% of the test length was re-worked.†

(†*This work was not necessary until two weeks before this report!*)

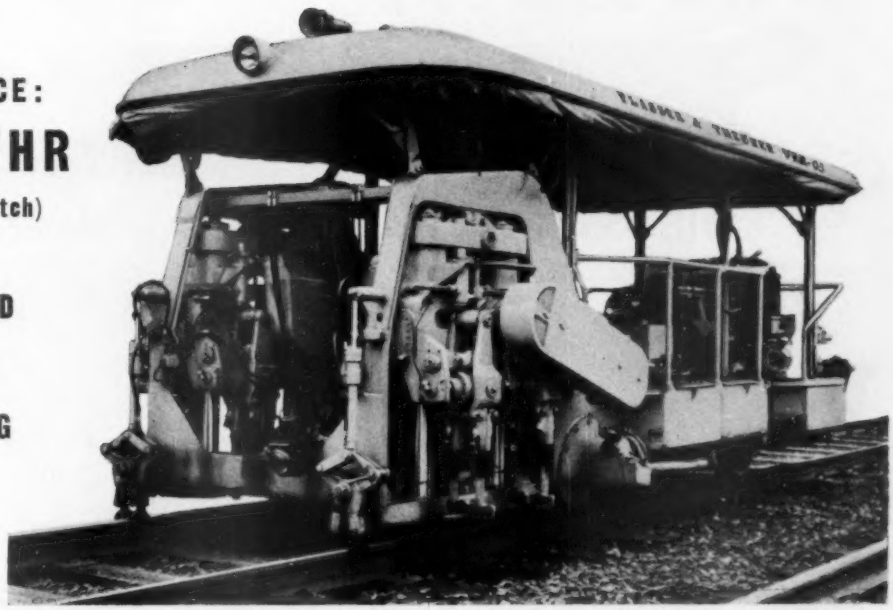
. . . for the PLASSER VKR-03

PEAK PERFORMANCE:

710 YARDS/HR

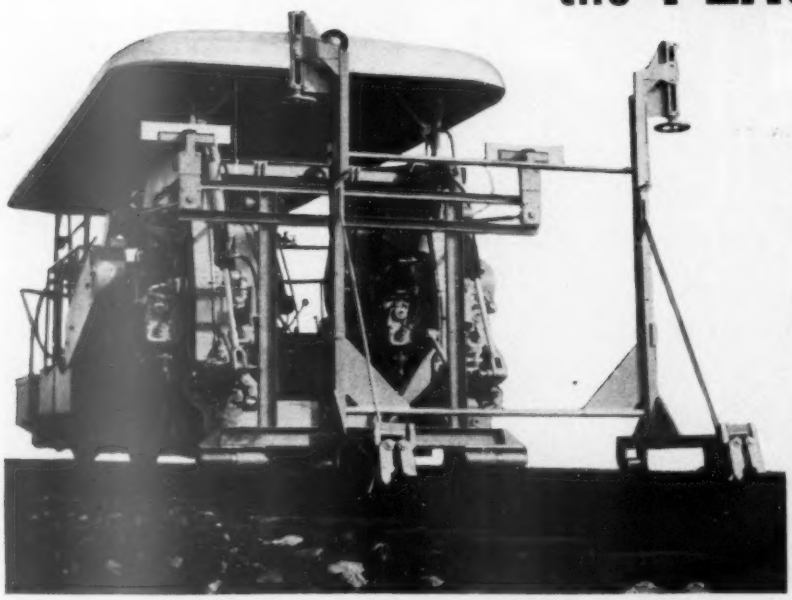
(According to sleeper pitch)

NON-SYNCHRONISED
FULLY HYDRAULIC
ON-TRACK TAMPING
MACHINE



now BRITISH TRANSPORT COMMISSION order 20 of the new model—

the PLASSERMATIC VKR-04



The PLASSERMATIC VKR-04 Model has all the test-winning features of its predecessor but has, for the first time ever, levelling, lifting and tamping operations carried out *all by the same machine!*

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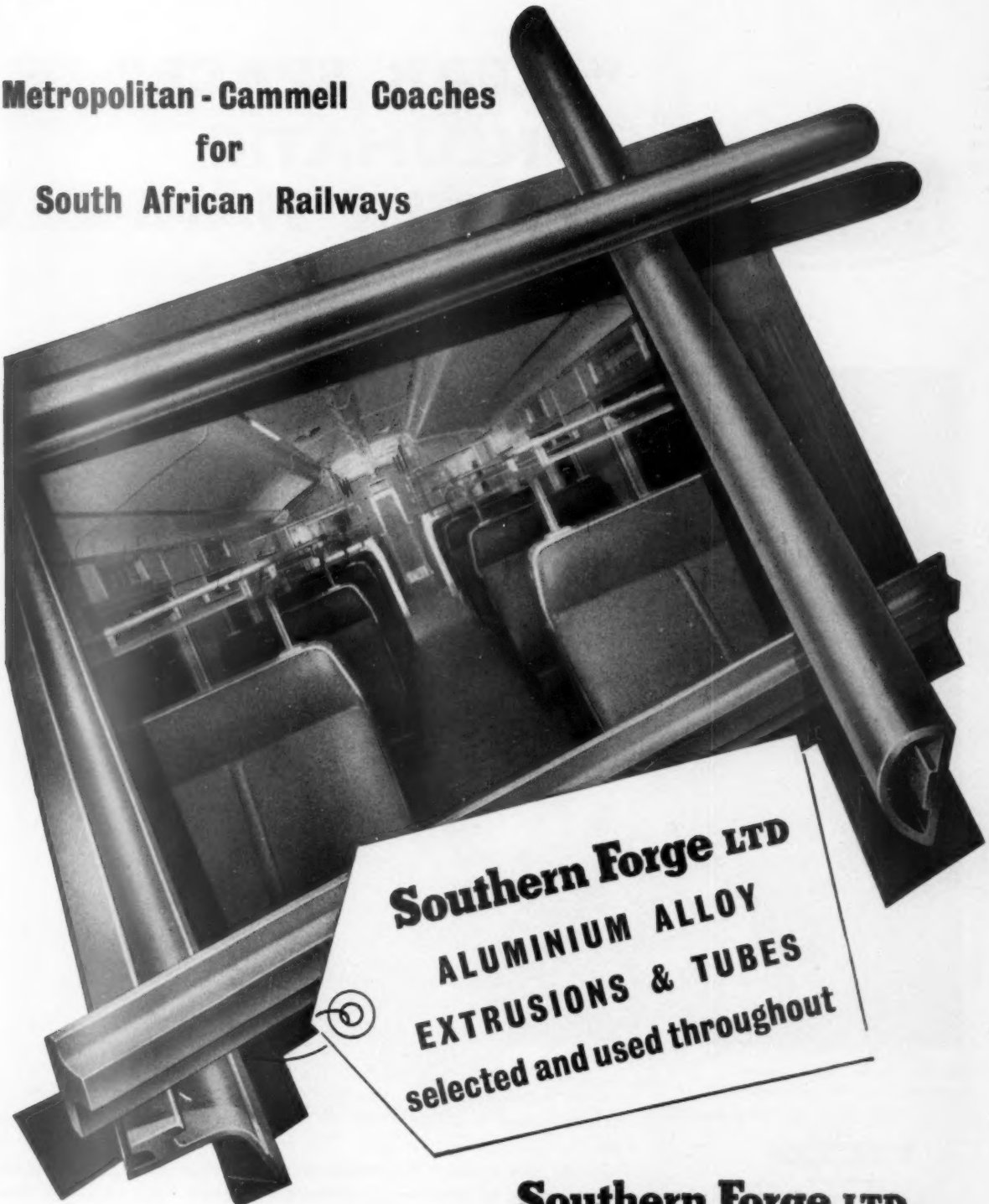

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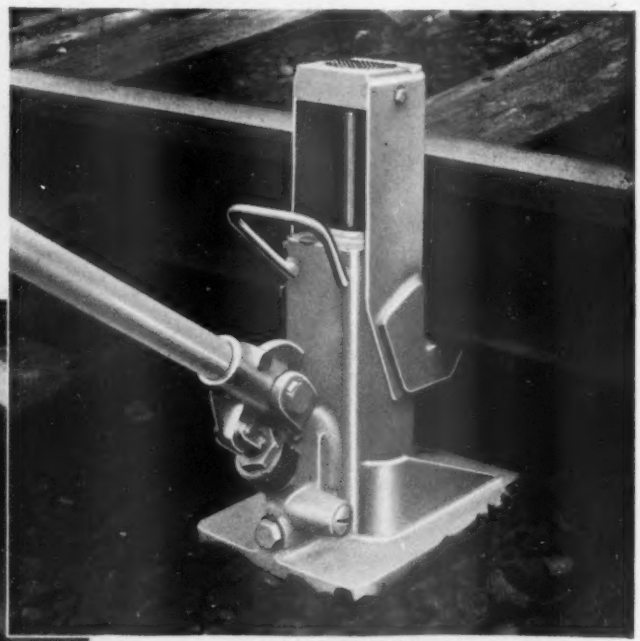

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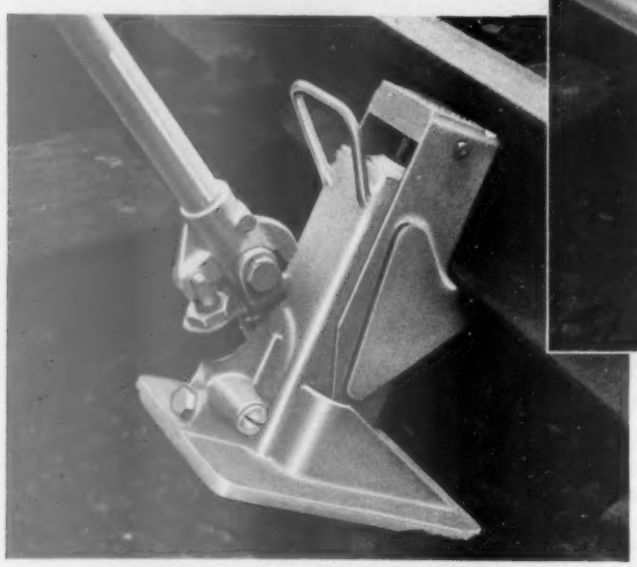

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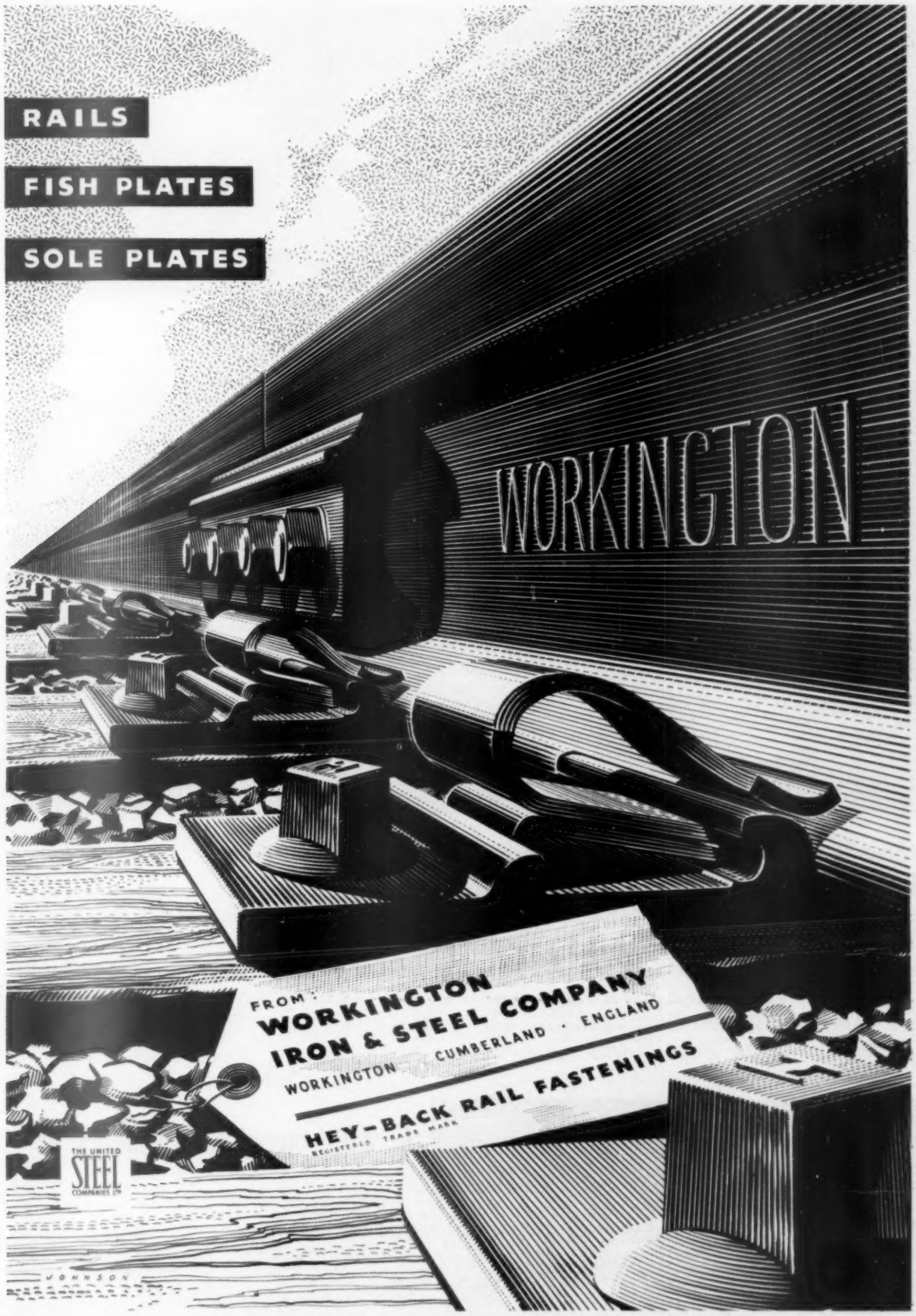
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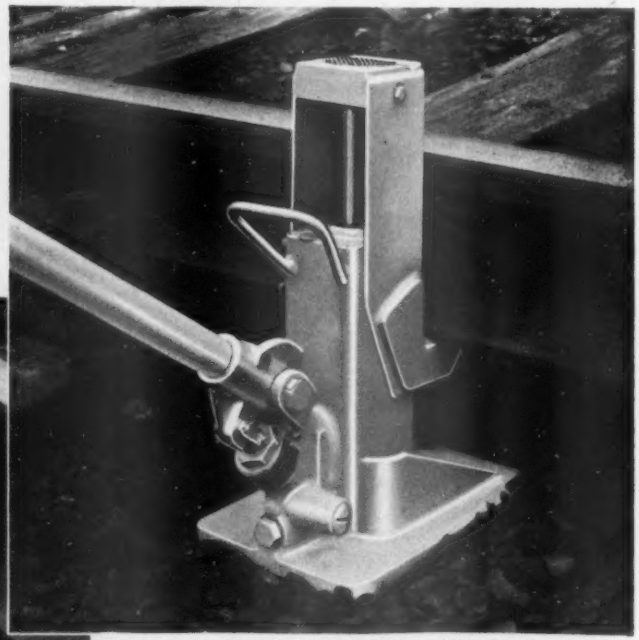

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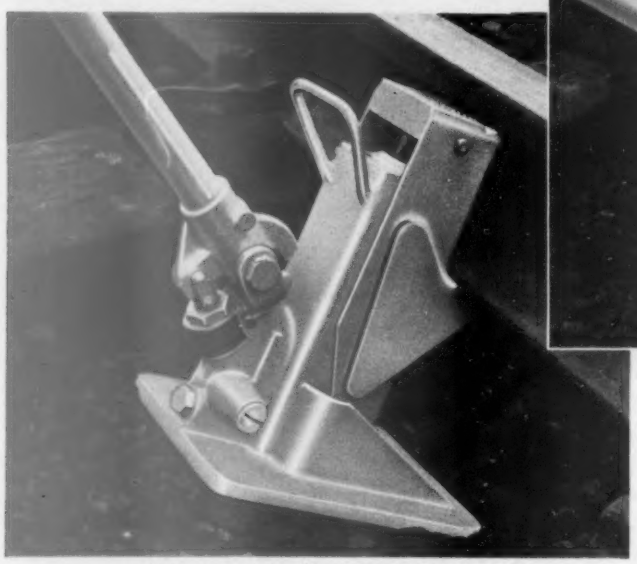

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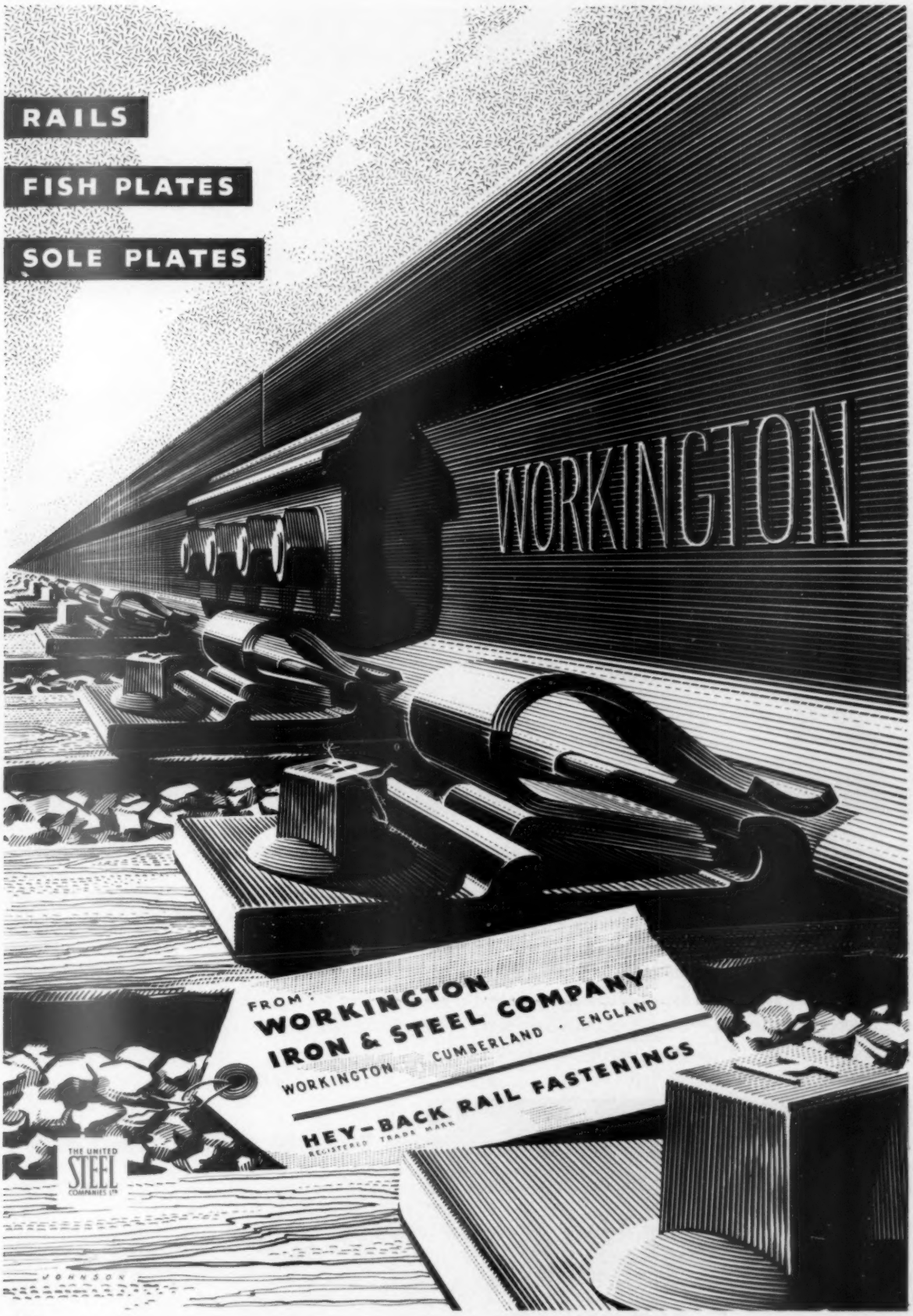
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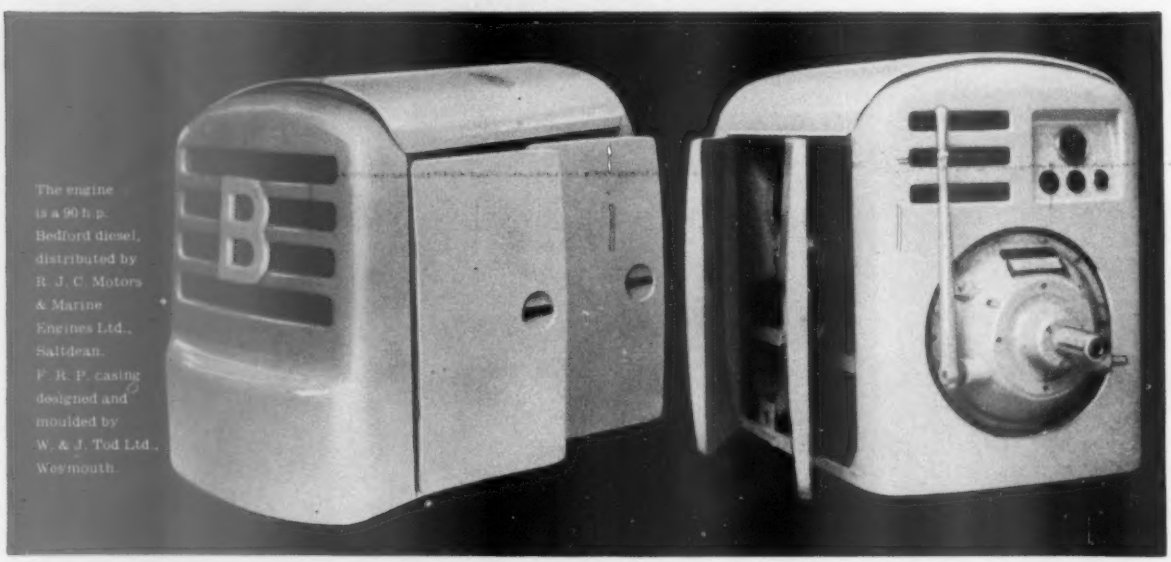

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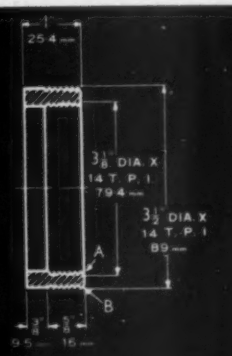

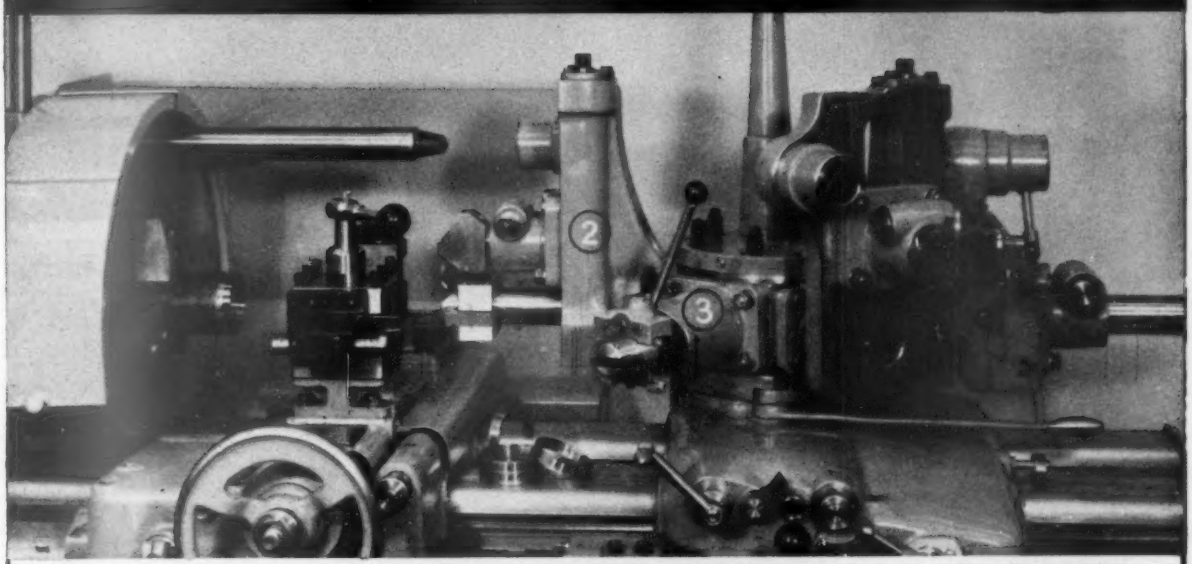

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	Hex. Turret	Cross-slide		Feet per min.	Metres per min.	Cuts per inch	m/m. per rev.
1. Feed tube to stop and close chuck -	1	—	—	—	—	—	—
2. Knee turn $3\frac{1}{2}$" dia., bore, face end and chamfer "A" and "B" - -	2	—	683	627	191	134	·19
3. Back chamfer bore - - -	3	—	683	560	170	Hand	Hand
4. Cut threads $3\frac{1}{2}$" and $3\frac{1}{8}$" dias. × 14 t.p.i. Whit. form, right hand (7 cuts) -	—	S.T.1	683	627	191	—	—
5. Part off - - - - - -	—	S.T.2	683	627	191	Hand	Hand

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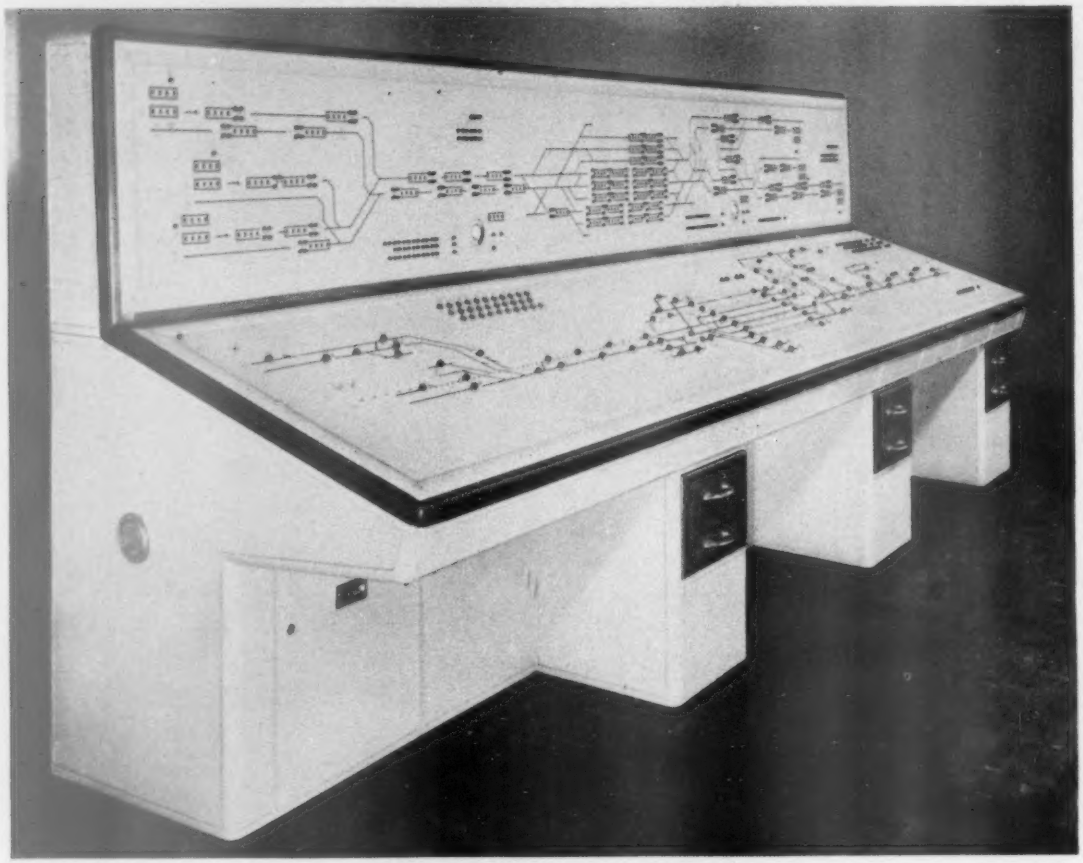

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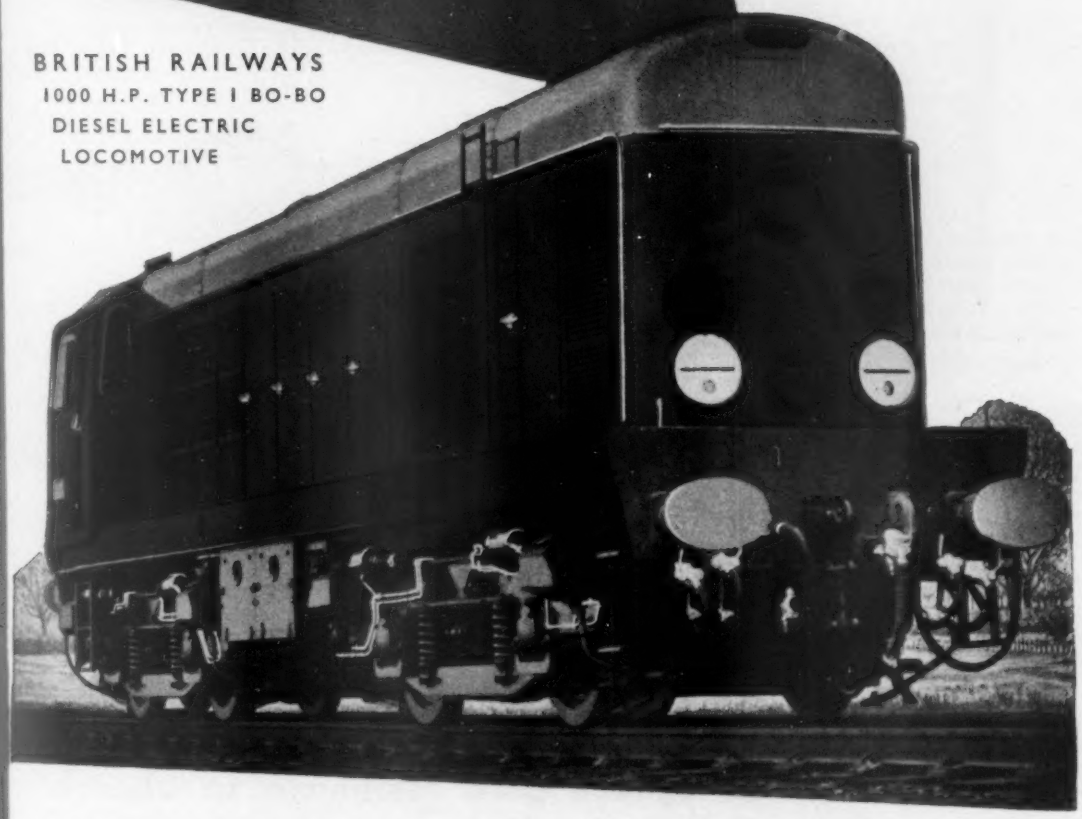

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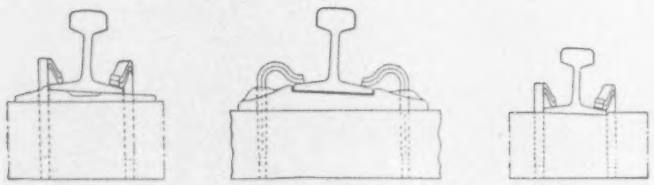

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A journal of Management, Engineering and Operation

VOL 114 FRIDAY MARCH 17 1961 No. 11

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Railways Board Chairman

THE appointment of the Chairman of the British Railways Board has been delayed longer than we had expected. All the evidence suggests that the Minister is now very close to announcing his choice for this office, which will be pivotal in the organisation for British Railways. It may be that by the time this issue appears the name of the person who will take over this appointment will have been announced. Meantime, it would be fruitless to speculate on the identity of the person chosen to hold what must be the principal office of the largest transport system in this country. One has to rely on the Government's reference to its recognition of the importance to get the right people to run British Railways. One recalls the promises which have been made by the Government and by Mr. John Hay, Joint Parliamentary Secretary to the Ministry of Transport, as to the criteria to be used. Mr. Hay said in the House of Commons on January 30 that "the ordinary man working on the railway will be glad that at last he will be run by people who really care about the railways and who are much more closely in touch with him and his problems than is now unfortunately the case." "People who really care about railways" in the sense required to fill adequately the position of Chairman of the British Railways Board must be very scarce outside the railway service and those few can hardly be dedicated to, or with long experience of, the railways If the choice is, or has been, made from outside the service, very special qualities will be required to overcome the natural scepticism of railway officers and men.*

Transport Tribunal hearing completed

THE 13-day hearing by the Transport Tribunal of the British Transport Commission's application for permanent authorisation of the increases, last May, of London area fares and season ticket rates, and to increase fares in the London area and season ticket rates outside London, ended on March 6. Mr. E. J. Fay, Q.C., for the Commission, told the tribunal that the body of opposition came from long-distance season ticket holders, and cited Brighton, 50 miles, and Folkestone and Ramsgate, 80 miles, as examples. British Railways did not regard the season ticket holder as a sort of milch cow; that was why substantial concessions were given. The proposed rates would give a traveller a discount of 60 per cent at 50 miles, and 66 per cent at 80 miles on a five-day week. Cost of travel was greater in these cases.

Selling freight services

ILLUSTRATED elsewhere in this issue is a 38-page booklet published by the North Eastern Region of British Railways for distribution to traders in the Region. The booklet contains attractively-illustrated descriptions of the wide variety of facilities for freight offered by railways in the North East, as well as a number of other suggestions on ways in which the railways can help industry. Specialised equipment ranging from the 135-ton transformer wagon to the 200-gal. "tote-bin" for carrying liquids in bulk are illustrated and described. Also included are a timetable of the principal express freight train services; a map of the Region's freight lines, and a list of local officers and agents, with addresses and telephone numbers. A laminated glazed protective skin protects the cover from hard wear and carries an attractive design in full colour on a background of the Regional tangerine.

Reducing capital liability

REFERRING in the Ulster Commons to the £200,000-a-year railway loss of the Ulster Transport Authority, the Minister of Commerce for Northern Ireland said he intended to discuss with the Minister of Finance the possibility of writing off part of the capital liability of the Ulster Transport Authority. His Government had been considering this step for some while, but had been waiting to see how British Railways would be treated. "While we are glad to see that the Government in Great Britain . . . has come basically to the same conclusions as we had on the question of writing off dead capital," said the

* As we go to press, the Minister announced that the Chairman of the new Railways Board would be Dr. Richard Beeching, Technical Director of Imperial Chemical Industries Limited.

Minister, " we were not surprised to find that the White Paper proposals, by themselves, could not automatically point the way to the measures which we should take." Probably in Ulster, as in railway circles in England, something a little more definite than the ambiguity of the Delphic Oracle would have presented a clearer—if not more acceptable—situation.

Two-tier covered car transporter

A MODEL of a two-tier covered car transporter (illustrated elsewhere in this issue) is on exhibition this week at Kings Cross in the Eastern Region of British Railways. The Region hopes to introduce the transporter this summer on the " Car Sleeper Limited," the overnight express carrying cars and passengers between Kings Cross and Perth. Each vehicle will carry up to six motor-cars—four in the upper and two in the lower deck. Carrying capacity is 12½ tons ; overall length is 64 ft. 1 in. over buffers and 60 ft. over headstocks, and height from rail level is 12 ft. 8 in. Loading will be by a ramp over which each car is driven by railway chauffers to the top deck. Cars to be conveyed to the lower deck will be lowered by electric hoist. The vehicles have been designed and will be built by Newton Chambers & Co. Ltd., in collaboration with British Railways. Another innovation on the " Car Sleeper Limited " is the introduction of two-berth instead of four-berth sleeping cars for all passengers.

Progress at Spencer Street

A MAJOR step in the reconstruction of Victorian Railways' Spencer Street Station, Melbourne, is the transference now in progress of the station's rail motor depot to a new location in the area. The site of the old depot will be used by a new platform for country trains which will replace two existing platforms. Sidings have been rearranged: the re-location of the lines, with some alterations to grading, affects about a third of the yard. Test bores have been sunk to determine the quality of the foundations for the new station building, and working drawings and specifications are being prepared. Pile-driving for the main section of the new diesel depot at Dynon has been completed and earthworks placed for depot and standard-gauge tracks in the area. Track between Benalla and Wodonga is being laid at a rate of over three miles a week. Signal alterations on the broad-gauge tracks and re-location of the equipment have begun.

Improving freight business on the C.N.R.

ADDRESSING the Canadian Industrial Traffic League, Mr. Donald Gordon, President of Canadian National Railways, recently outlined plans to extend the use of special incentive freight rates and to increase the railway sales force to take advantage of improved methods of freight handling, pricing, and service. Mr. Gordon believes that salesmen in the field are the vital link with users: he is reorientating operating department agents at small stations throughout the country and is giving greater individual responsibility. He predicts that the rapid extension of the piggyback network will continue: although he expects the boxcar to remain dominant in siding-to-siding movements of volume, he thinks the piggyback is more attractive for the movement of small loads. A substantial part of the market requires road-rail transport—this has been built up by the acquisition by the C.N.R. of road haulage companies. The use of inter-line rate arrangements with independent road carriers will be explored.

Standards engineers conference, 1961

THE seventh annual conference of engineers and others concerned with the application of standards will be held during May 9-10 at the Connaught Rooms, London, and at British Standards House, Park Street, London. It will be opened by Viscount Hailsham, Lord President of the Council & Minister for Science. The first day will comprise plenary sessions and Sir Stanley Harley, Coventry Gauge & Tool Co. Ltd., will preside. There will be a contribution on the trades union viewpoint on industrial standards by Mr. G. Doughty of the Association of Engineering & Shipbuilding Draughtsmen, and papers entitled "An integrated standards programme in the company"; "Standards in product development (electronics)," " Standards in market research and sales "; " The application of a standards system in a smaller company "; " Steel—variety reduction by manufacturers and users "; " Standardisation in fields where techniques are advancing rapidly "; " Standardisation in a 1-off and batch production company," and " The unified screw thread in British industry."

Russian progress in electrification

WRITING in *Pravda*, Mr. Boris Beshchev, Minister of Railways for the U.S.S.R., recently stated that, of the 40,000 km. of railway electrification scheduled during the 15-yr. period 1955–70, 8,483 km. have been completed. This mileage includes the 5,000-km. Moscow—Irkutsk and 1,200-km. Moscow—Donbas lines. The policy is to electrify complete routes instead of individual sections to enable locomotive runs to be lengthened with crews working in shifts. Time saved by goods trains on the electrified Moscow—Irkutsk line amounts to two days. Russian technology of electrification has been improved: use is increasingly being made of a modern system of a.c. electric traction with industrial frequency and a voltage of 25,000 in the contact wires. Lines with a total length of 1,400 km. have been changed to a.c., including heavy-traffic sections of the Krasnoyarsk and East Siberian railways. To reduce the expenditure of copper on the overhead wire, use is being made of steel-copper trolley wire and steel-aluminium supporting wire.

Electrical manufacturers' report

THE fiftieth annual report of the British Electrical & Allied Manufacturers' Association well illustrates the new high levels attained by the industry, despite the difficulties with which it has to contend. Technical achievements and the increased pace of technological advance, changes in Government policy, and varying commercial conditions together present far-reaching implications the impact of which has emphasised the value and importance of the work performed by BEAMA. It is their policy to give priority to export efforts, the successful build-up of which is particularly important at a time when European economic integration will give Britain's continental competitors a large market. The valuable prizes shortly to be won include an export potential of £190 million in railway electrical equipment alone. BEAMA has accomplished much in the half-century of effort which is concluded by the present report. The transport industry and purchasers of its equipment have benefited greatly from the lead which has always been taken in fostering close co-operation with railways.

Railways in Africa

IN OUR issue of February 17, we referred to the establishment of a new authority in Swaziland to take over responsibility for the proposed line which will link that territory with the railway system of Portuguese East Africa. In view of the current position in Africa, it is encouraging that the Colonial Development Corporation is showing faith in railways in that area by this new investment. The combined cost of building the railway and developing the iron-ore deposits at Bonvu Ridge will be some £12 million and the line is an essential pre-requisite to these development plans. At the meeting in London, the Colonial Development Corporation was represented by Lord Howick and by Sir John Elliot, who in view of his long railway experience had been asked to advise on this project. On the

civil engineering side, Mr. V. A. M. Robertson, formerly Chief Civil Engineer of the Southern Railway, was brought into the discussions. The importance of these overseas undertakings, from a national viewpoint, is considerable, and it is good that experienced railway officers, such as Sir John Elliot, Mr. Robertson, and Mr. Frank Pope, are at hand to give the benefit of their experience.

Increases in "smalls" charges

TO OFFSET the growing cost of handling small consignments, British Railways' charges for this kind of traffic by merchandise train and for parcels by passenger train are to be increased from April 3. Consignments by goods train weighing up to 5 cwt. will be charged about 10 per cent more, with smaller increases for consignments between 5 cwt. and one ton. Charges for parcels at owner's risk by passenger train including unaccompanied bicycles, perambulators and similar traffic, will also go up by about ten per cent. Manufacturers and traders are being advised of the impending changes through their trade associations, and a book containing new scales for goods by merchandise train will be available after March 20 from the Railway Clearing House, 203 Eversholt Street, N.W.1, at 3s. 6d. a copy. Although the upward movement in these charges is unlikely to be welcomed by traders, there can be no doubt that it is amply justified from the railway viewpoint.

The demise of "Bradshaw"

SHERLOCK HOLMES, in "The Valley of Fear," commented that "the vocabulary of Bradshaw is nervous and terse, but limited," and yet John Bright is said to have remarked that the two most widely read books in English were the Bible and *Bradshaw*. Only a public institution could be mentioned thus, and therefore the announcement last week that the issue of *Bradshaw* is to be discontinued, is of far wider interest than merely the abandonment of an old-established publication. George Bradshaw was born at Pendleton, Lancashire, on July 29, 1801. On leaving school, he was apprenticed to an engraver, and set up in business for himself in this trade in Belfast in 1820. As this enterprise was not successful, he returned to Manchester in 1821, and there established the business now known as Henry Blacklock & Co. Ltd. At first he engaged in general engraving but, from about 1827, specialised in maps, many of which were beautifully executed and coloured. They indicated the newly established passenger railways, and thus directed Bradshaw's thoughts to the emergence of a revolutionary system of transport which was to transform the face of the country. Bradshaw wished to add letterpress printing to his activities and to create a sale for his large unsold stock of maps. He found the solution in launching *Bradshaw's Railway Time Tables*. The first issue contained details of the northern railways only, but it was followed within a week by one giving timetables for the whole country, price 1s. Because he was a member of the Society of Friends (Quakers), Bradshaw objected to the adoption in the calendar of the names of heathen deities, and his publication was dated 10th Mo. 25th, 1839. The page size was 4½ in. x 3 in., and the timetables extended across an "opening," or two facing pages. There were numerous maps and town plans. Subsequent books were issued at frequent but irregular intervals under the title of *Bradshaw's Railway Companion* and, from April, 1841, large monthly sheets were also published for 3d., from which revised tables could be cut and pasted in the book.

Bradshaw's Railway Guide, a regular monthly publication, measuring approximately 6 in. x 4¾ in., first appeared in December, 1841, and this was the direct ancestor of *Bradshaw* of today. The only copy known to exist is preserved in the Bodleian Library, Oxford. It was a sixpenny publication, and thus virtually destroyed the demand for the 1s. *Companion*. Nevertheless, the latter continued to be issued until the end of 1848, almost certainly because of Bradshaw's enthusiasm as an engraver for the fine engraved and tinted maps it contained. The page size adopted for the *Guide* was approximately twice that of the *Companion*, and the timetable setting was the same. While the three publications were running side by side, a two-page opening of the *Companion* was one page of the *Guide*, and also a section of the large sheet *Time Tables*. Thus continuity from the first issue was preserved. Probably to give an air of even older establishment than was the case, at a time when competition from newer timetables was severe, the serial number jumped by 100 from No. 40 in March, 1845, to No. 141 in April. This has never been rectified. In June, 1847, Bradshaw produced his first *Continental Railway Guide*, which survived until the outbreak of war in 1939. In 1853, he travelled to Christiania (now Oslo), Norway, when cholera was raging. He was one of the victims, and died on September 6 of that year, aged 53. By this time his publications, although unofficial, were produced in the friendliest co-operation with the numerous railway companies, but not always had this been so. In earlier years some had been "vehemently opposed" to timetables showing arrival times, fearing that this would "make punctuality a sort of obligation." The traditional price of 6d. survived until January, 1916. It emerged from the 1914-18 war as 2s., and that remained unchanged until 1937; it is now 12s. 6d. The once-familiar buff cover continued to be used until 1939, as also did the Quaker numbering of the month, but with the conventional name in brackets. During the first war some railways used *Bradshaw* excerpts as their official timetables, beginning with the G.W.R. in April, 1917. This was a war emergency, but the Southern Railway adopted the practice regularly in 1924, and the L.N.E.R. did so in May, 1939. The use of *Bradshaw* excerpts became general in the 1939-45 war and lasted into nationalisation. Henry Blacklock & Co. Ltd. is not severing its long railway association. Its printing activities continue, and it prints five of the six Regional timetables of British Railways.

Mass transportation in the future

LOCAL passenger transport by road and rail formed the subject of the address given by Mr. L. C. Hawkins, F.C.A., M.Inst.T., Member, London Transport Executive, to the Institute of Transport in London on March 13.

The factors influencing public use of transport were considered at some length, for mass transportation is basically a reflection of the habits and activities of the people who use it. It was pointed out that the attitude of the public in Britain towards public transport, and the reliance placed on it for daily travel, must be preserved, and in this everyone who works in transport has a part to play.

Railways have an advantage in that they require no space in the centre of a city for parking, for space is increasingly difficult and costly to provide. Growing street congestion makes it imperative not only that more people should be conveyed by railways in London, but that new railway facilities should be provided. In carrying capacity, as well as speed, railway travel has its great advantage. Experience in Toronto has shown that a single track of underground railway can do the work, in a single traffic hour, of 16 express lanes used wholly by motorists, and of 57 ordinary street lanes. Town and country planning and transport are inextricably linked.

Planning authorities can do much to assist transport, although it was not suggested that transport should dominate planning. Living places, industry, offices, shopping centres, and places of entertainment can be so sited that they bring together a diversity of interests, which in turn will create a reasonable spread of traffic over the day, and so enable efficient public transport services to be provided. The necessity for recognising this mutuality of interest between planning and transport is cogently argued in the "Report of the Royal Commission on Local Government in Greater London."

What is needed, Mr. Hawkins suggested, is a clear-cut

recognition of the continuing necessity in the foreseeable future for large-scale local travel by public transport, with the intention that planning shall proceed on a basis which, alongside the use of motor cars, will facilitate its maximum convenient use in the public interest. The transport system itself would then be adapted to meet changing conditions, cutting out what becomes unnecessary or wasteful and developing new facilities where they were required.

The financial future of public transport will have to be secured. Economy and efficiency in providing the services will be essential in the future as in the past, but the quality of the services will always depend, in the long run, on the money that is available to support them, which can only come from the fares paid by the passengers.

Financial hazards have to be accepted in public transport undertakings as in other industrial and commercial undertakings, and this applies both to fluctuations and trends in the volume of revenue earning business and to the costs that have to be incurred to earn the revenue. Yet the finances of many transport undertakings are balanced on the knife-edge of narrow revenue margins. What progressive commercial undertaking would be prepared to live on a price schedule which allowed a surplus, assuming everything to go according to plan, of no more than 2½ per cent over its working and fixed expenses? It is because of narrow margins that frequent applications have to be made for approval of higher fares, with all the public disturbance they cause, disturbance which is commercially undesirable in any selling organisation, which is what London Transport is. With more ample financial cover, fares policy could be fixed on a longer term basis, and the financial stability which is essential to solvency would be strengthened.

British Transport Commission traffic receipts

THE British Transport Commission's traffic receipts for four weeks ending February 26 continue to show that gradual progress is being made, although the overall increase compared with the same period last year is only 7·35 per cent. British Railways passenger receipts were 9·66 per cent up compared with the second four-weekly period in 1960 but cognisance must be taken of intervening fares increases. Freight receipts show an increase of 0·15 per cent, Livestock and Parcels were 4·92 per cent and 1·25 per cent up respectively. Minerals and Coal & Coke continued to show a decline, probably as a result of the mild weather allied to the National Coal Board's declared policy of diverting short-hauled coal traffic to road. In spite of these factors the revenue from Coal & Coke increased slightly in the second four-weekly period this year compared with four weeks ending January 29.

	Four weeks to		Incr. or decr.	Aggregate for eight weeks to		Incr. or decr.
	Feb. 26, 1961	Feb. 28, 1960		Feb. 26, 1961	Feb. 28, 1960	
	1961 £000	1960 £000	£000	1961 £000	1960 £000	£000
Passengers—						
British Railways ...	9,578	8,733	+ 845	19,148	17,825	+ 1,323
London Transport—						
Road passenger services	4,357	4,201	+ 156	8,585	8,393	+ 192
Railways	2,140	1,891	+ 149	4,290	3,892	+ 398
Provincial & Scottish buses	4,311	4,059	+ 252	8,591	8,137	+ 454
Ships	202	192	+ 10	487	437	+ 50
Total passengers ...	20,588	19,076	+ 1,512	41,101	38,684	+ 2,417
Freight, Parcels & Mails—						
British Railways—						
*Merchandise & livestock	8,183	7,799	+ 384	15,913	15,704	+ 209
*Minerals	3,756	3,824	− 68	7,547	7,751	− 204
*Coal & coke	9,430	9,757	− 327	18,637	19,407	− 770
*Parcels, etc., by coaching train	4,137	4,086	+ 51	8,057	8,069	− 12
*Total freight British Railways	25,506	25,466	+ 40	50,154	50,931	− 777
†Others	4,739	4,457	+ 282	9,268	8,290	+ 978
Total freight, parcels & mails	30,245	29,923	+ 322	59,422	59,221	+ 201
Total	50,833	48,999	+ 1,834	100,523	97,905	+ 2,618

*Includes receipts from collection and delivery, etc.
†Receipts from railway movements wholly within dock areas, included in previous periods under "Freight, Parcels and Mails," are now classified as miscellaneous.

PERCENTAGE VARIATIONS 1961 COMPARED WITH 1960

	Four weeks to February 26, 1961	8 weeks to February 26, 1961
British Railways:		
Passengers	+ 9·6	+ 7·4
Parcels	+ 1·2	− 0·1
Merchandise & livestock	+ 4·9	+ 1·3
Minerals	− 1·7	− 2·6
Coal & Coke	− 3·3	− 3·9
Total	2·6	0·8
Ships (passengers)	+ 5·2	+ 11·4
British Road Services, Inland Waterways & Ships (cargo)...	+ 6·3	+ 11·8
Road Passenger Transport, Provincial & Scottish ...	+ 6·2	+ 5·6
London Transport—		
Railways	+ 7·9	+ 10·0
Road Services	+ 3·7	+ 2·2
Total	5·7	7·1
Aggregate	3·7	2·6

Experimental London Transport tunnels

OVER half a century has elapsed since the last tube railway across central London was constructed, and over 20 years have passed since a new section of such a railway was built by London Transport. In the interim period new knowledge of the stresses and strains in tube tunnels has been obtained by special tests, including the removal of original tube linings and, as a result, new designs of linings have been evolved entailing new methods of tunnelling. London Transport considered it essential that it should test these new methods so that the quickest and most economical form of tube tunnelling available could be used where appropriate for the Victoria Line. Contracts were therefore placed early last year for the construction of two experimental lengths of twin tunnel, one running from Finsbury Park to Manor House and the other from Netherton Road (Tottenham) to Manor House, where the two lengths of tunnel meet. The total length of twin tunnel involved is about one mile and the cost will be about £1 million.

The object of the work is to give full-scale experience of new methods of tunnel construction in readiness for the Victoria Line and other future tube lines. The experimental length is on the alignment of the Victoria Line and will be incorporated into it when authority to build the line is given. The new methods would save some millions of pounds on the cost of the 11½-mile line.

The Finsbury Park–Manor House section is being lined with concrete-block segments of a new pattern and the Netherton Road–Manor House section uses a new type of flexible jointed cast-iron lining without bolts and with much shallower flanges than those of conventional linings. Previously, tube tunnels have been lined with bolted cast-iron segments, built inside a shield, with cement grout forced into the space left as the shield moves on between the outside of the segments and the surrounding ground. Although reliable, this method is slow and higher priced. The tunnels are being bored by a rotary type of shield called a "drum digger" which can work much faster than any previous type of shield used for tube railway construction in London and which provides for conveyors to remove the spoil.

Using the cast-iron lining method, the contractors for the eastern half of the tunnel, Edmund Nuttall, Sons & Co. (London) Ltd., have just completed the driving of a 934-ft. length of tube tunnel, including the excavation and lining in two weeks. This, representing a speed of 3½ ft. of new tunnel built per working hour, is believed to be a world record for driving and lining a tunnel of this size through clay soil. It is about double the speed which would be considered good going with previous techniques. One drive of each type of tunnel

has now reached Manor House, where a cross passage has been built connecting the two. This also enables the engineers to close their survey traverse at tunnel level and thus obtain very accurate junctions between the second and first drives. Work is now complete on the second drive from the Netherton Road end, and the drum digger has started on the second drive from the Finsbury Park site. When the tunnels eventually become part of the Victoria Line, the cross passage at Manor House will be extended to give access to an electrical sub-station serving the new line.

The work is being carried out to the requirements of Mr. C. E. Dunton, M.A., M.I.C.E., Chief Civil Engineer, London Transport Executive. The consulting engineers for the concrete-lined Finsbury Park–Manor House section are Sir William Halcrow & Partners, and the contractors Kinnear Moodie & Co. Ltd. Consultants for the Netherton Road–Manor House section, lined in cast-iron, are Messrs. Mote, Hay & Anderson. Contractors are Edmund Nuttall, Sons & Co. (London) Ltd. Manufacture of the concrete lining segments has been undertaken, for the first section, by Charles Brand & Co. Ltd. The iron segments for the last-mentioned length have been cast by Stanton Ironworks Co. Ltd., Head Wrightson Limited, Iron Founders Limited, Smith Patterson Co. Ltd., and the Anderson Foundry Co. Ltd.

Britain's rail links with Europe

SPEAKING at Cardiff, on March 7, to the South Wales & Monmouthshire Railways & Docks Lecture & Debating Society, Mr. J. L. Harrington, Chief Shipping & International Services Officer, British Transport Commission, chose as the subject of his address, "Britain's links with European surface transport." He drew attention to the manner in which, in recent years, the political and economic associations between the United Kingdom and the countries of Western Europe have grown closer and pointed out that political and economic factors and the uncertainties of the Channel tunnel project have hindered the planned provision of short-sea facilities from Britain for nearly a hundred years. The tidal range around our coast had been a further reason for the tardy introduction of vehicle ferries. Tidal range is of great significance in the development of any ferry route. For speed and easy terminal operations—particularly with rail or heavy road vehicles—it is necessary to use end loading and discharge, and to take account of the maximum permissible gradient (and also the change of gradient) in the link between ship and shore. With passenger coaches it has not been thought prudent to have a gradient steeper than 1 in 29 but, with other types of traffic, it is possible to work with steeper inclines. These considerations determine the location of the ferry terminals, which must be sited in relatively quiet water, otherwise the integrity of the link between ship and shore could not be maintained: but, subject to observing this primary condition, there are three choices. These are (1) constructing an enclosed dock, with machinery for impounding water, (2) positioning the terminal on a site in an existing enclosed dock system, in which there is normally little variation in the water level, and (3) where port possibilities permit, selecting a relatively sheltered area of water, open to the sea, and constructing a terminal with a link span of sufficient length to give a gradient workable under all normal tidal conditions. The primary purpose of the train ferries is the through conveyance of freight wagons. Because of the differences between the British and Berne loading gauges it has been necessary to construct special rolling-stock. Some 11,000 such wagons are available, mostly owned by continental railway administrations or wagon-owning companies.

Experience has amply demonstrated that the capacity of a train ferry route is closely related to the facilities on land for handling the traffic, and in recent years attention has been directed to improving these shore facilities.

The movement of traffic between Britain and the continent is co-ordinated, regulated, and brought to financial account with the aid of various international organisations, of which the most important is the International Union of Railways (U.I.C.), whose decisions on technical, traffic and financial matters have a significant influence on the development and shaping of international traffic by rail.

Interfrigo and Transfersa are remarkable creations of recent years; the former owns 1,710 refrigerated wagons and is building more, the latter has 1,772 wagons with interchangeable axles for running on 4 ft. 8½ in. or 5 ft. 6 in. gauges. Latterly, exports from Britain by train ferry have been increasing and there is a better traffic balance; it is, therefore, appropriate that attention should be directed towards the building and ownership by the B.T.C. of wagons suitable for through working to the continent.

To some engaged in sea transport by conventional-type ships, it may be seen that the employment of ferry vessels can only result in waste stowage and an investment in ships of larger size and powering than would otherwise be necessary. In some respects, this is true, but there are many compensating advantages, such as the reduction of turn-round time in port, saving of port-handling costs, speedier throughout transits for freight and, in some instances, a lower standard of packing.

The future of cross-Channel ferries is not without its problems. When making an assessment factors to be considered include air competition, peak traffics, and the tunnel project. Until a decision is reached on the tunnel there must be justifiable hesitation about spending money on ferry developments involving the building of new tonnage, shore works and the opening up of new routes.

Centenary of railways in South Africa

MR. D. H. C. DU PLESSIS has sent us a copy of his report as General Manager of South African Railways & Harbours for the year ended March 31, 1960, the centenary year of the system. This is Mr. du Plessis's last report, for he retired on March 12, 1961, on reaching the age limit of 63 after completing 45 years' service, including eight as General Manager. He has taken the opportunity of reviewing the system's development from the opening in June, 1860, of a short section of line between Durban and Point. Mr. du Plessis deals in particular with the last 50 years, and recalls that many and, in some respects, revolutionary changes have taken place since he joined the service. It is unique, he points out, as in contrast with railway undertakings in other countries it embraces all forms of transport—rail, road, sea, and air. The resulting co-ordination, he stresses, has been a big factor in ensuring the financial stability of the railways and an overall balance in the transport pattern.

From the 7,577 route-miles and a goods traffic of 12·5 million tons in 1910, the system has grown to a route-mileage of 13,564, serving 790,000 square miles of territory and carrying 82 million tons of goods traffic annually. Ton-miles have risen from 229,117 to 2,311,217, revenue from £12 million to £182 million, total passenger journeys from some 51 million to 295 million, and the capital account from £89 million to £665 million. In addition, road transport now serves a route-mileage of 31,175 and South African Airways has a fleet of 29 aircraft, including some Boeing 707's.

Turning to the most recent year's results, Mr. du Plessis says that it commenced on a somewhat disquieting note, but towards the end of the period there was a notable general revival in traffic offering, resulting in striking revenue improvements. Working results of all services yielded a surplus of £8,085,787, after transferring £1 million to betterment fund and £25,200 towards the deficiency in the pension fund. Of the net surplus, £346,890 went to eliminating the deficit brought in and £7,738,897 was transferred to rates equalisation fund, which was completely exhausted when the credit balance of £7,818,565 at March 31, 1959, was absorbed in meeting the deficit for that year.

The figures for the railways, including road transport and other ancillary services, are given in the following table of principal results :—

	1958-59 Thousands	1959-60 Thousands
Passenger journeys	274,389	294,711
Goods tonnage	67,733	70,286
Passenger train-miles	23,010	23,697
Mixed train-miles	7,274	7,261
Goods train-miles	68,619	68,732
Total train-miles	98,903	99,690
Total freight ton-miles	22,285,495	23,112,461
	£ Thousands	£ Thousands
Passenger receipts	19,051	21,278
Parcel and mails receipts	5,179	5,222
Goods, coal and livestock receipts	121,259	129,398
Total receipts *	153,798	164,754
* Including miscellaneous		
Total expenditure	113,471	110,551
Depreciation	10,116	11,709
Working expenses	103,355	98,842
Surplus	40,327	54,203
Interest and other charges (net)	45,277	48,846
Balance, railways	Dr. 4,950	5,355

In comparison with 1958-59, revenue from railway services increased under all heads except mails, grain elevators, and tourist services. The principal increases were in passengers (including £2 million from the consolidated revenue fund for losses sustained by the administration in connection with the provision of rail transport to non-white re-settlement areas), goods and coal. The full year's operation of the higher goods tariffs also contributed to the better income.

Traffic generally moved freely, and the extension of electrification from the Reef to Kroonstad in November, 1959, enabled a number of main-line steam locomotives to be diverted to other sections and also released a number of diesel-electric locomotives which were re-allocated to the Witbank section. At the close of the year (in which 522 miles were electrified) the total length of electrified track was 2,708 miles, or almost 15 per cent of the Union's rail network. In addition to 472 electric locomotives in service, a further 198 were on order, and the existing 387 motor coaches were due to be supplemented by another 113 coaches.

In all, a considerable quantity of new rolling stock was placed in service during the year. Allowing for coaching stock withdrawals, there was a net addition of 21 to 6,051 vehicles. Eighty electric and 30 diesel-locomotives were delivered, and the carrying capacity of merchandise-carrying wagons showed an increase of 121,274 tons, or 3·91 per cent, to 3,223,707 tons. During the year revenue expenditure incurred on additional facilities on open lines and the improvement and extension of existing facilities totalled £35·4 million, a decrease of £15 million on the previous year's figure. This big fall was due largely to the completion in 1958-59 of several major works undertaken to increase the carrying capacity of the railways, such as the doubling, deviation, and electrification of main-line track.

Yet another year of satisfactory operations by South African Airways yielded a record revenue of £9,700,914 against expenditure of £9,084,242, to give a surplus of £616,672 compared with a loss of £158,395 in 1958-59. In July, 1960, S.A.A.'s first Boeing 707 inter-continental jet airliner was received.

The major harbours handled 436,514 tons, or 2·4 per cent more cargo at 17,868,470 tons.

Route-mileage of the road transport service went up by 1,101 miles during the year to 31,175 but operation of these services resulted in a deficit of £147,128, although this was only half the preceding year's loss of £269,118. Revenue increased by £210,294 because of the upward trend in all classes of traffic except passenger. Goods tonnage conveyed reached a new peak at 2,628,509 tons, including a record amount of 435 million gallons of petrol. Train and engine mileage at 113,638,542 was also a new peak by 839,393 miles.

The intensified financial control has been extended, and the electronic computer system is in operational use. By the middle of 1961 it is hoped to have preparation of pay vouchers for all white staff on the Western Transvaal system completely " computerised."

Turnover of the Stores Department during the year dropped 40 per cent from £215,764,023 to £129,547,153.

LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

PRESTRESSED CONCRETE SLEEPERS

March 9

SIR, Your Australian correspondent, whose letter on the nomenclature for prestressed concrete sleepers you published in your issue of January 27, appears to be confusing the " stressing " of the concrete with the alternative methods of tensioning the steel.

Surely the concrete product is prestressed regardless of whether the steel is " pre-tensioned " or " post-tensioned," and as far as is known these latter terms are conventionally used for the description of the final products.

Yours faithfully,

STANLEY MARCHANT,
B.SC.(ENG.), A.M.I.MECH.E.

21 Melvinshaw,
Leatherhead, Surrey

BRITISH RAILWAYS MOTIVE POWER

February 25

SIR, With reference to Mr. Robert W. Lewis' letter under the above heading in *The Railway Gazette* for February 24, 1961, the question he raises appears to have been well covered by Mr. H. F. Brown's paper " Economic results of diesel-electric motive power on the railways of the United States of America," presented to the Institution of Mechanical Engineers on November 30, 1960. This paper was reviewed in your issue of December 16, 1960, and certainly provides food for thought.

Yours faithfully,

A. W. T. DANIEL, M.A., PH.D., A.M.I.C.E.

3 Hallway,
Purley, Surrey

COMMUTER TRAFFIC

February 27

SIR, Although Mr. Sherrington in your issue of February 24 draws attention to the difficulties with which the railways serving New York have had to contend with during the strikes of the last half-year, and the grievous financial losses to the companies concerned and their season ticket holders, his statistics of comparing the 400,000 or more passengers carried by the London Southern Region with the approximate number of only 200,000 into Manhattan Island, will not afford much, if any, comfort or satisfaction to the injury caused to the American traveller by these strikes.

After all, a strike is a strike in whatever country it occurs, and the originators of them—whether they be legitimate or otherwise—are not usually concerned with the welfare or rights of the sufferers concerned.

Yours faithfully,

ROBERT W. LEWIS

" Beth-El," 104, Leggatts Way,
Watford, Herts.

The Scrap Heap

Drinka pinta . . .

The driver of a train from Eastbourne to Reading received facial injuries when a milk bottle was thrown from an overhead bridge near Dorking Town station last week. Forceful advertising ?

The narrow view

Part of old narrow gauge railway between Barnstaple and Lynton, closed in 1935, may be used as a scenic railway. Negotiations are in progress with Lynton Urban Council for permission to run miniature trains along half-a-mile of the old route.

The Portpatrick Railway

There is every probability that this line will be open for traffic the second week in March. At a meeting on Thursday with the other railway companies at Dumfries . . . some of the directors with the manager of our railway passed along the line to attend the meeting and returned in the evening. The journey from Castle-Douglas to Stranraer . . . was most comfortably made in exactly two hours . . . It is intended to begin with two trains a day each way.—*Wigtownshire Free Press, of February* 25, 1861.

Automatic vending

It is 78 years since the first public automatic vending machine appeared; installed at Mansion House Station in London, it sold postcards and writing paper. It was the forerunner of the 200,000 or more machines which may now be seen all over the country in towns and villages, railway stations and airports, shops and factories. No longer confined to selling writing materials or 1d. packets of chocolate, the machines of today are made with great precision and besides cigarettes and confectionery will sell anything from cooked meals to coal, postage stamps, railway tickets, and groceries.—*From* " *The Financial Times*."

Meet reward

A few weeks ago the stationmaster at Alton, Southern Region, British Railways, received £5 from Mr. H. K. Goschen, Joint Master of the Hampshire Hunt, who asked that the money be shared among drivers of diesel trains in the area as a token of appreciation " for their consideration when hounds stray on to the line during a hunt." The stationmaster passed the £5 on to Mr. S. C. Townroe, District Motive Power Superintendent, Eastleigh. Acknowledging the gift, Mr. Townroe pointed out that as many as 50 drivers worked over the route, and that the wish of all the men concerned was that the money be given to the Southern Railwaymen's Homes for children and old people at Woking. The remittance was duly sent to the Secretary-Superintendent of the homes.

Destructive timber preservative

The fire which destroyed the 1,200-ft. long timber bridge of the South Wales Railway over the Usk at Newport on May 31, 1848, is believed by a correspondent to have been unique, at least among railway bridges. The wood had been "kyanised," which made it highly inflammable; the process, introduced by John Kyan in 1832, consisted in steeping or soaking the timber in a solution of mercury chloride. Work began on May 31 on completion of the centre span. A workman drove in an iron bolt which had been heated, perhaps to straighten it. The wood caught fire, which could not be put out by water kept at hand, and the whole bridge burned quickly and collapsed. When it was re-built, wrought-iron, bow-string girders were substituted for timber in the centre span, and the other 10 spans were renewed in timber. Many years later the bridge was again re-built. The many fires which destroyed wooden trestle bridges in North America seem usually to have been ascribed to sparks from wood-burning locomotives igniting dry timber in hot weather; but inflammability may have been increased by application of unsuitable preservatives.

The most important person on our railroad...
Meet the most important person on our railroad: The Customer.
The Customer is the reason we have a railroad—the reason we have jobs.
JOB
The Customer isn't an outsider—he's the heart of our business.
The Customer isn't an interruption in our work—he's the purpose of our work.
The Customer expects courtesy: if we're indifferent, he'll go where he's welcomed.
WELCOME
The Customer isn't somebody to argue with; you may win the argument . . . and lose the Customer.
Though many of us never come face to face with the Customer, everything we do affects the service he hires us to perform.
The smile of the satisfied Customer is our only job security.
In brief: It's the Customer who pays our wages. To keep him happy, and to stay on his payroll . . .
Let's take care of him!

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The facts of life

OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

HUNGARY

Railway development

Presenting the 1961 State Budget in Parliament on February 22, the Hungarian Finance Minister stated that 1,500 million forints (about £45 millions) will be spent on continuing the dieselisation of the Hungarian State Railways and on the further electrification of the Budapest-Miskolc line. Diesel and electric locomotives and passenger coaches will be bought and the road fleet increased by 1,700 lorries, 330 buses, and 585 lorry and bus trailers.

SWEDEN

Successful year's operation

The Swedish State Railways report that 1960 was the second best year for goods traffic (7,700 million ton-km.), a record year for iron-ore transport (16 million tons), and a year showing increased passenger traffic (a rise of 2 per cent).

NORWAY

Completion of suburban electrification

On February 1 the 90-km section of the Bergen-Oslo railway was from Oslo East to Honefoss, together with the branch from Roa to Jaren. With this conversion, the entire Oslo suburban service of the Norwegian State Railways has become electrically-worked.

DENMARK

Part closure of private lines

By July 1, the 12-mile Nykoebing-Nysted and the nine-mile Saeby-Frederikshavn private railways (jointly owned by the State and local interests) will be partly and wholly closed respectively. The Nykoebing-Nysted line on the island of Lolland will cease to carry passengers, though goods traffic will continue in view of the considerable sugar beet traffic offering in the autumn. The Saeby-Frederikshavn Railway in Northern Jutland is part of the system jointly operated as Aalborg Private Railways, and covers the Aalborg-Fjerritslev-Thisted, Aalborg-Saeby-Frederikshavn, and Asa-Oersoe lines. Part of the reason for its impending closure lies in the fact that the station serving it in Frederikshavn, which is owned by the State railways, is to be moved nearer the town's harbour. The re-siting would mean that the railway line would have to run through the city. Although operation will cease completely on July 1, passenger traffic will stop after Easter.

MOROCCO

Fast service scheduled

The Moroccan Railways are to introduce in April a fast service between Casablanca and Tangier, using the Alsthom-de Dietrich diesel railcar sets supplied in 1957. The journey time will be 5 hr. 50 min. in each direction, and the trains will connect by ferry steamer with the recently accelerated night trains between Algeciras and Madrid, reducing the through journey time from Casablanca to Madrid to 25 hr. Until recently, this journey took 37 hr. with two nights en route.

EAST AFRICA

E.A.R. & H. Revenue and tonnages

Total earnings from railway and harbour services during January last in the East African Railways & Harbours system were approximately £2,177,000 compared with £2,239,000 in the same month last year. Railway earnings were £121,000, and harbour earnings were £14,000 below the level estimated for the month under review. Railway revenue decreased by £32,000; goods by £18,000, livestock by £4,000, hotels and catering by £3,000, inland marine services by £1,000, road services by £3,000, and miscellaneous earnings by £4,000. Passenger and other coaching traffic increased by £500.

ISRAEL

New line under consideration

Mr. M. Savidor, General Manager of Israel Railways, has stated that the representative of a foreign construction concern is visiting Israel to study the possibility of laying a railway line from Beersheba to Eilat, with a branch to Sdom. According to a study made on the subject four years ago, the cost of planning and realising this project would be I£50-60 millions. Mr. Savidor also stated that a proposal in principle to build the line had been received from another international concern and that both offers were being studied by the Ministry of Transport.

WESTERN AUSTRALIA

Damage from Bushfires

Considerable damage occurred to railway property at Dwellingup, a town in the South Western part of Western Australia, during recent bushfires. The station buildings at Dwellingup and Holyoake were burnt out, together with several departmental houses at these centres. Damage to track also occurred, and a train was trapped for three days. No lives were lost, but several casualties from burns were recorded. Over 300 people were rendered homeless and the town of Dwellingup was almost completely destroyed. The railway refreshment rooms were handed over to the Red Cross as a temporary relief centre, and meals were served to all fire victims for several days. A special train comprising 11 carriages and a brakevan containing rugs and other supplies were dispatched to North Dandalup to provide accommodation for residents from affected areas. The train was used as sleeping accommodation for one night by evacuees from Banksiadale.

VICTORIA

Apprentices in Victorian Railways

An apprenticeship training centre has been opened by the Victorian Government Railways at Newport. It will take its part in training 220 apprentices who joined the system this year, one of the largest intakes of apprentices ever accepted by the railway. Most of the apprentice are between 15 and 17 years old, and many are from country districts. Their apprenticeships will be for five years.

Victorian Railways close four stations

Marcus, Curlewis, Leopold, and Mannerim Stations on the Geelong-Queenscliff line of Victorian Government Railways have been closed because they were not earning sufficient revenue even to cover maintenance costs. The nearest stations open for freight in the area are South Geelong and Drysdale.

CARRIAGE AND RAILCAR BOGIES: their design and development—I

This first section of a five-part article deals with modes of oscillations, design procedure, and rubber and air springs

By J. L. KOFFMAN, *Design Engineer (Projects), Chief Mechanical Engineer's Department, British Railways Central Staff*

THE study of earlier articles on various aspects of bogie design might have suggested that the considerations governing the final choice of suspension parameters will shortly approach the status of an exact science. It must be stressed that a long period will elapse before the time is likely to be reached when knowledge of track gauge, wheel diameter, tyre conicity, sprung bogie and body mass, heights of centres of gravity, moments of inertia, and distance between bogie centres will enable designers to determine the requirements of superb riding qualities over the entire range of speeds and track conditions likely to be met in service.

All that can be done at present solely with pencil, paper, and slide-rule is to determine the natural frequencies of bouncing, pitching, nosing, and lateral oscillations* and of rolling and swaying, to choose spring characteristics and swing link proportions to avoid resonance at operationally important speeds and undue sensitivity to vertical and lateral impacts, and to determine damper characteristics to ensure acceptably small oscillation amplitudes at resonance, without facing unduly harsh riding at speeds above resonance.

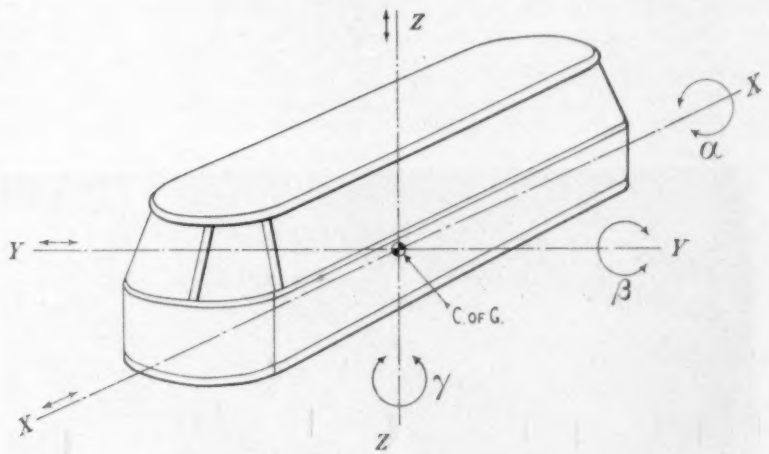
Use of computers

The use of analogue and digital computers will be of appreciable assistance as soon as more is known about what actually happens in the limited world between wheels and rails, particularly as far as excitation forces are concerned. Admittedly, all this is already a great deal more than was possible only a few years ago when vehicles were designed mostly on the basis of previous experience along certain patterns of slow intuitive evolution, generalised rules, preferences, and prejudices, but it still is not as much as is necessary to guarantee perfect riding of completely new vehicle types.

Apart from providing assistance at the design stage, an appreciation of vehicle fundamentals is valuable as an aid to diagnosing trouble, should this arise. In such cases, the knowledge of previously-calculated and experimentally-verified frequencies and amplitudes is of considerable assistance in tracing the cause of poor riding qualities and of excessive forces encountered by vehicle components or imposed on the track.

At present, it is practically impossible to ensure an entirely satisfactory design *ab initio*, mainly because of ambiguities as far as the excitation forces in the vertical and lateral plans and the friction present between vehicle components are concerned and because of irregularities in the cross-level of the track. If all these magnitudes were known it would be relatively easy to determine the amplitudes of the various oscillation modes and thus to obtain greater reliability regarding riding qualities in terms of ride index values. Even then, the matter would be further complicated by the fact that most oscillation modes do not appear in isolation, but are coupled with one or more of the other modes. Thus, the vehicle body will bounce up and down along the Z-axis (Fig. 1) but only if the system represented by the vehicle is symmetrical.

This means that weight carried by each bogie, its distance from the centre of gravity, and the spring characteristics must be identical. In this case the body, subjected to simultaneous impacts of equal magnitude, will move up and down, without rotating, about the Z-axis through the centre of gravity. If, as is usually the case, these conditions do not apply, bouncing will be accompanied by rotation about the Y-axis, a motion generally known as pitching. Conversely, pure pitching only can be encountered under ideal conditions while, in practice, the rotation about the Y-axis generally is accompanied by an up-and-down motion along the Z-axis.


Z
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α
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C. OF G.
γ
X
Z
Z-Z BOUNCING : γ NOSING
Y-Y LATERAL : β PITCHING
X-X SHUTTLE : α ROLLING
1. LATERAL (Y) + NOSING (γ) = Yγ - HUNTING
2. LATERAL (Y) + ROLLING (α) = Yα - SWAYING
3. BOUNCING (Z) + ROLLING (α) = Zα - (SHIMMY)
4. BOUNCING (Z) + PITCHING (β) = Zβ - GALLOPING
5. SHUTTLE (X) + PITCHING (β) = Xβ - ROCKING
6. SHUTTLE (X) + NOSING (γ) = Xγ - (JERKING)

Fig. 1—Motion about or along a common axis indicates coupling of modes

Simultaneous pitching and bouncing

Because with railway vehicles the oscillation exciting forces are scarcely ever likely to be applied at the centre of gravity of bogies or bodies, pitching and bouncing will occur simultaneously. As shown in fig. 1, the resultant Zβ-motion can be described as galloping. Similarly the oscillations along the Y-axis will appear simultaneously with γ-rotation about the Z-axis. The latter motion is known as nosing, while the combined Yγ-motion is described as hunting.

* Oscillations in this context refer to low-frequency, relatively large amplitude displacements. Vibrations refer to high frequencies and relatively small amplitudes.

The combination of lateral oscillations along the Y-axis, combined with rolling about a longitudinal axis, will result in Yα-swaying. The Zα-motion can be described as shimmy, the Xβ-motion as rocking, while "jerking" appears to be the nearest approach to the Xγ-motion. Furthermore, the oscillations with a common translatory component are also coupled so that one will excite the other. Thus, hunting will excite swaying, shimmy will induce gallop, and rocking will excite jerking.

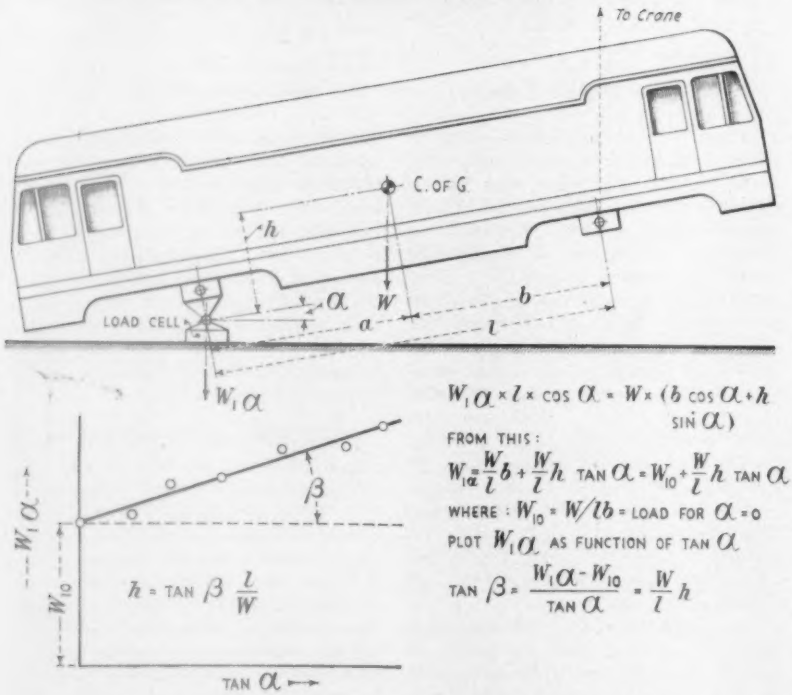
Complexity

Although these considerations relate to the vehicle body only, they indicate the complexity of vehicle dynamics. These are further complicated by the action of the bogies in turn affected by the motion of the axles which move vertically along their own Z-axes, pursue a γ-motion and, because of the tyre conicity, also rotate about the X-axis in α-motion. Even the apparently simple motion of bogie pitching is made complex by the fact that this takes place only ideally about a fixed Y-axis. In practice, the pitching bogie will tend to move the vehicle body fore-and-aft (shuttle) and the resultant reaction will move the axis of pitching up and down. The fore-and-aft forces can be amplified by rubber used at the point of linking the bogie to the body. Because of this great care must be devoted to the choice of plane of linkage, length of traction rods, and elasticity of the attaching devices.

The solution of the numerous simultaneous differential equations, which must be considered in the case of a body resting on two bogies, is facilitated by the use of digital computers. The true difficulty lies in the lack of precise knowledge regarding the magnitude and pattern of excitation and resistance forces at any one instance, of the precise magnitude of the damping and inertia forces, and of the elasticity of the numerous components involved.

Some assistance will be provided by the use of analogue computers, which can show the oscillation patterns of idealised systems excited by impulses based on records of track irregularities or oscillation patterns of existing vehicle assemblies. The result will provide valuable generalised information, but cannot ensure a completely reliable final design.

Valuable assistance in bogie development is provided by roller test rigs as used by the East and West German Railways and by the Japanese Railways. The use of models is sometimes considered as an aid to bogie and vehicle development, but even if every care is taken to observe the laws of similitude, it will not be possible to scale down all relevant friction forces. Because of this, models are likely to be of assistance only as aids, and very effective ones at that, to the understanding of the general pattern of vehicle behaviour, while full-scale " models " should be employed for the actual development as far as riding characteristics are concerned. Scale models are very useful when dealing with finer points of bogie frame and component stressing.


To Crane
C. OF G
h
LOAD CELL
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l
W₁α
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W₁α
W₁₀
h = TAN β W/l
TAN α
W₁α × l × COS α = W × (b COS α + h SIN α)
FROM THIS:
W₁α = W/l b + W/l h TAN α = W₁₀ + W/l h TAN α
WHERE: W₁₀ = W/l b = LOAD FOR α = 0
PLOT W₁α AS FUNCTION OF TAN α
TAN β = (W₁α − W₁₀)/TAN α = W/l h

Fig. 2—Determination of height of centre of gravity by weighbridge or load cells

Design procedure

At present, with the facilities normally available, we are limited to a design procedure generally along the following lines:—

The static deflections of the primary and secondary springs are determined on the basis of sprung bogie and body masses and by the requirements for low ride-index values as well as reduced dynamic loads imposed on the track, particularly at operationally important speeds.(*)

Attention must be devoted to the lower natural frequencies of bouncing (f_1) and pitching (f_3). The two higher frequencies (f_2 and f_4) normally do not present any problem, provided that damping is right for f_1 and f_3. The pitching frequency f_3 is the more important one and its value should be determined for varying load (inertia) conditions encountered in service.

The determination of f_3 and, later on, of nosing, swaying, and rolling frequencies

(*) A more direct approach is provided by some robust short cuts. Thus, a Russian rule calls for an overall static deflection of 1 mm. per 1 km.p.h., i.e., 100 mm. for 100 km.p.h., and so on. This is not far off the mark, but still calls for additional detailed checking along the above lines

Height of Centre of Gravity in inches

Vehicle	Bogie under tare Above Axles	Body Above Rail Level
B.R. Std. Coach ...	3·25	69·5
B.R. Railcar Trailer ...	3·9	72·5
B.R. Railcar	3·8	59
B.R. Diesel el. Loco. ...	1·5	77
A.C. Electric Loco. ...	2·65	82

Fig. 3—Determination of height of centre of gravity of bogie frame

and amplitudes presupposes knowledge of the magnitudes of the moments of inertia of the vehicle body about the three axes through the centre of gravity, the position of which must be known. In the first instance the former values can be estimated in terms of vehicle length, but more precise calculations are justified when considering final layout. The approximate height of the centre of gravity is usually known, and this does not vary appreciably with vehicles of the same type. The exact height of the centre of gravity can be determined with the aid of a weighbridge, or load cells, and cranes (Fig. 2). These determinations are advisable with vehicle bodies and bogies of entirely new types. The process is not popular with production and maintenance shops, but can be carried out at weekends, during holiday periods or at night. The determination of the centre of gravity of lighter and simpler structures can be carried out along more direct lines (Fig. 3).

In the case of passenger vehicles, overall static spring deflection should be about 6 in. to 7 in. Weight and installation of individual coil springs should permit their handling by one man†, while dynamic stress and fatigue considerations, rather than static stresses, should be instrumental in determining spring sizes. To avoid ambiguity and to prevent misunderstanding, spring size and stress calculations should be carried out along well-defined lines with stress limits specified as a function of mean and maximum stresses, the complete calculation being presented in terms of a standardised procedure.

†This is often overlooked, thus making shop overhaul more difficult and expensive. The author is grateful to Mr. C. E. Collins for pointing this out

Rubber springs

The use of rubber springs is becoming increasingly popular with tramways and city railways. Here, their use is encouraged by limited speeds and low static deflections, lower weight, reduced maintenance requirements, and reduced noise transmission.

As far as the last point is concerned, effectiveness is sometimes reduced because metal components frequently bridge the rubber assemblies and thus provide an effective path for noise transmission. Much often is made of the damping properties of rubber, but the provision of vertical and lateral dampers at bolster assembles employing rubber suspension shows that this often is inadequate, which is not surprising as normal suspension rubber has a damping factor of only about 0·05.

Combined with friction forces, the total damping factor then increases to about 0·1, still an inadequate figure for satisfactory riding. Increasing the inherent damping of the rubber components might lead to dynamically unsatisfactory characteristics, because the response will become similar to that of a leaf spring with which the effective "dynamic" stiffness increases at small amplitudes. This

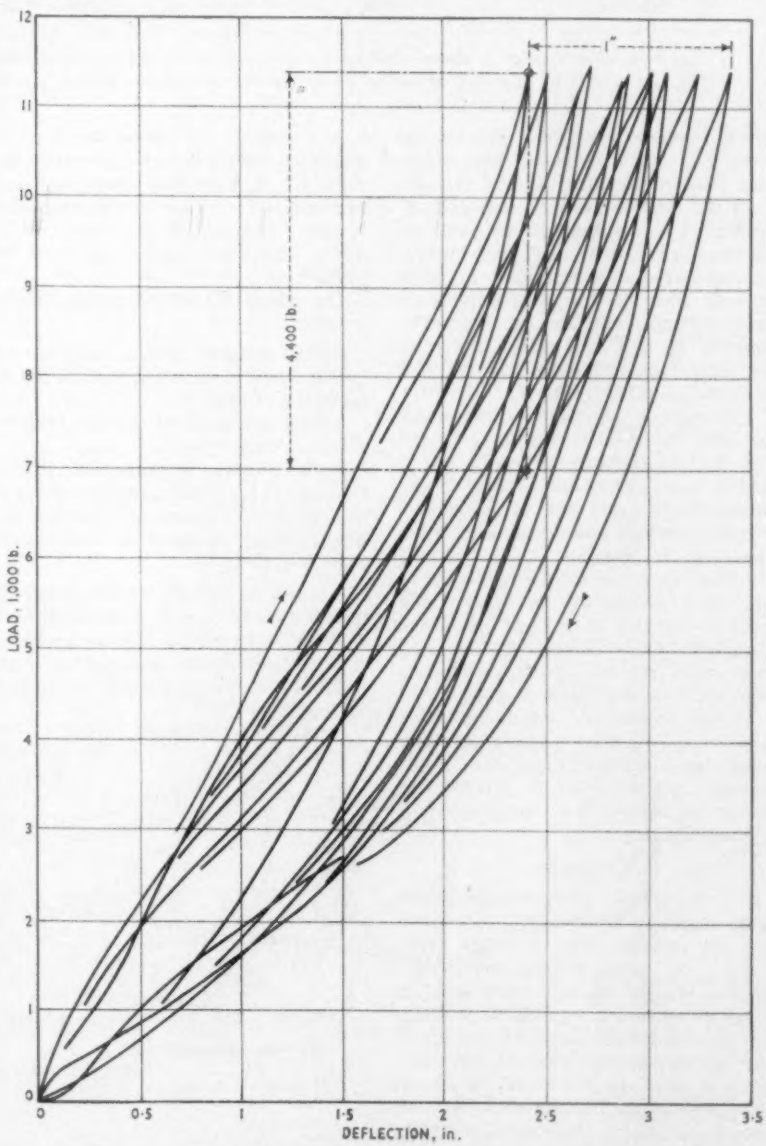


Fig. 4—Scatter of rubber spring characteristics

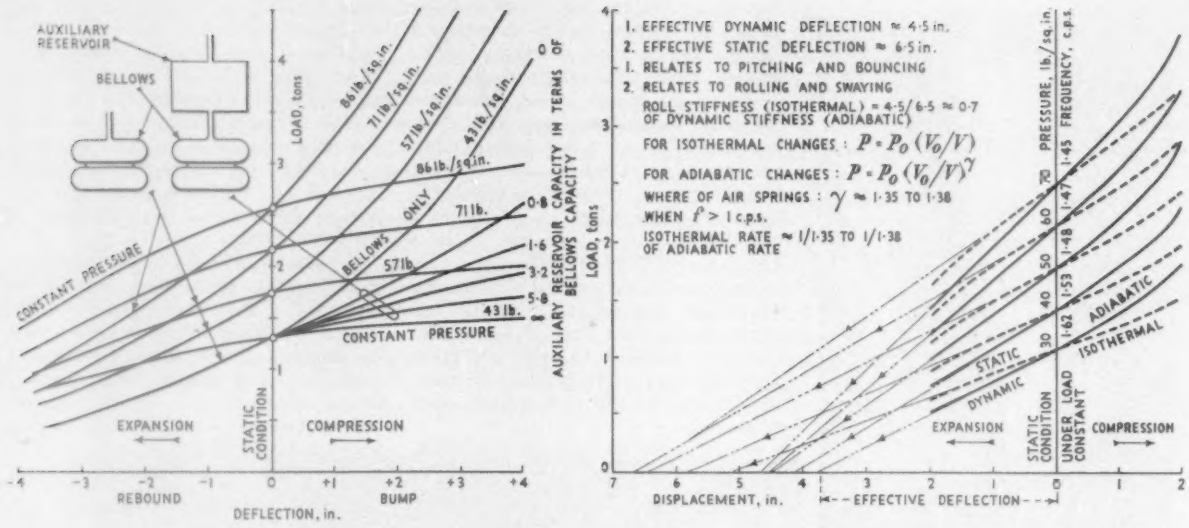


Fig. 5—Characteristics of double-bellows air spring as influenced by size of auxiliary reservoir and by air pressure. The characteristics of a typical vehicle air spring and their interpretation in conventional terms are shown on the right

also is the reason that rubber units become "stiffer" with increasing frequencies and when subjected to sudden impacts.

In the case of low-deflection primary springs, it was possible to eliminate the dampers previously used with helical springs. Due allowance must be made for the effect of low temperatures on both stiffness and damping properties, and for the ability of manufacturers to maintain consistent characteristics. This point is illustrated by Fig. 4.

Consequently careful inspection might be called for. The use of rubber elements can provide elasticity along the X, Y, and Z axes, and suitable characteristics about the first and last, in the case of primary springs, can be of assitance in reducing the tendency to hunting. On the other hand, elasticity along the X-axis of bolster springs can induce excessive body shuttle excited by bogie pitching if the lateral connection between bogie and body does not coincide approximately with the Y—axis of bogie pitching.

If the suspension design precludes positive axle location ensuring that both axles remain at right angles to the track, suitable means should be provided to permit adjustment and maintenance of this requirement.

Air springs

Air springs offer attractive possibilities with bogies used in heavy suburban and city services. Here, with lightweight bodies, the ratio of load/tare weight approaches and exceeds unity and, as good riding should be ensured throughout, a constant low natural frequency of vertical oscillations should be the aim. Up to a point, this can be met by springs with non-linear characteristics but, to ensure a natural frequency of body pitching of, say, 1·5 cycles per sec., the bolster springs must have a static deflection of about 4.5 in. under tare load. If maximum static deflection is not to exceed about 6.5 in., frequency under load and overload will increase to approximately 2 and 3 cycles per sec. respectively. Buffer and floor heights also will be affected.

The use of bolster air springs should provide:—

Almost constant natural frequency of bolster suspension in the vertical plane, regardless of load.

Almost constant floor and buffer height, also regardless of load.

Reduced noise level in the vehicle because of reduced intensity of noise generation and transmission—provided the spring is not "bridged" by metal guide components.

It should be stressed that the use of air springs does not consist in fitting bellows or similar units in place of existing springs and relying on the elastic properties of air to do the rest. This oversimplified method of approach has been tried from time to time with rather intermittent success. The relatively small volume of the bellows or similar units makes the springs rather sensitive to change of load at constant air pressure (Fig. 5), which relates to fast and consequently adiabatic changes.

Slow changes of load

Slow changes of load permit maintenance of isothermal characteristics. Consequently, while it is possible to ensure a height equivalent static deflection, the moment of dynamic load is imposed the spring stiffness will increase, this leading to harsh riding. To overcome this, overall spring volume can be increased with the aid of auxiliary reservoirs connected with the spring units. The dynamic stiffness can be appreciably reduced, for the change of total volume resulting from oscillations will then be small.

The dynamic characteristics at each

Continued on page 312

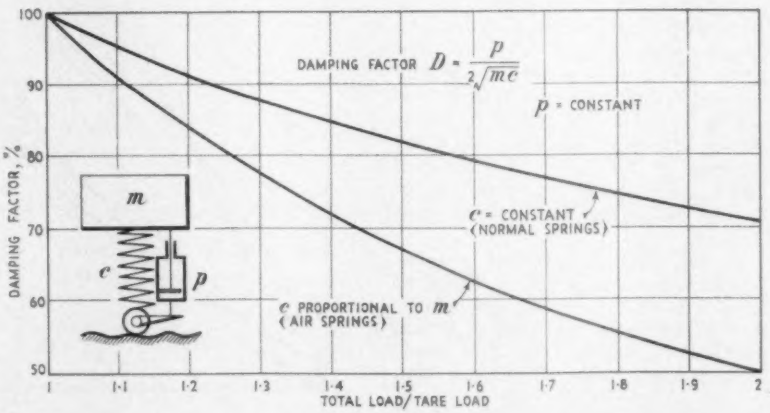


Fig. 6—Effectiveness of hydraulic dampers when used in conjunction with conventional springs and with air springs

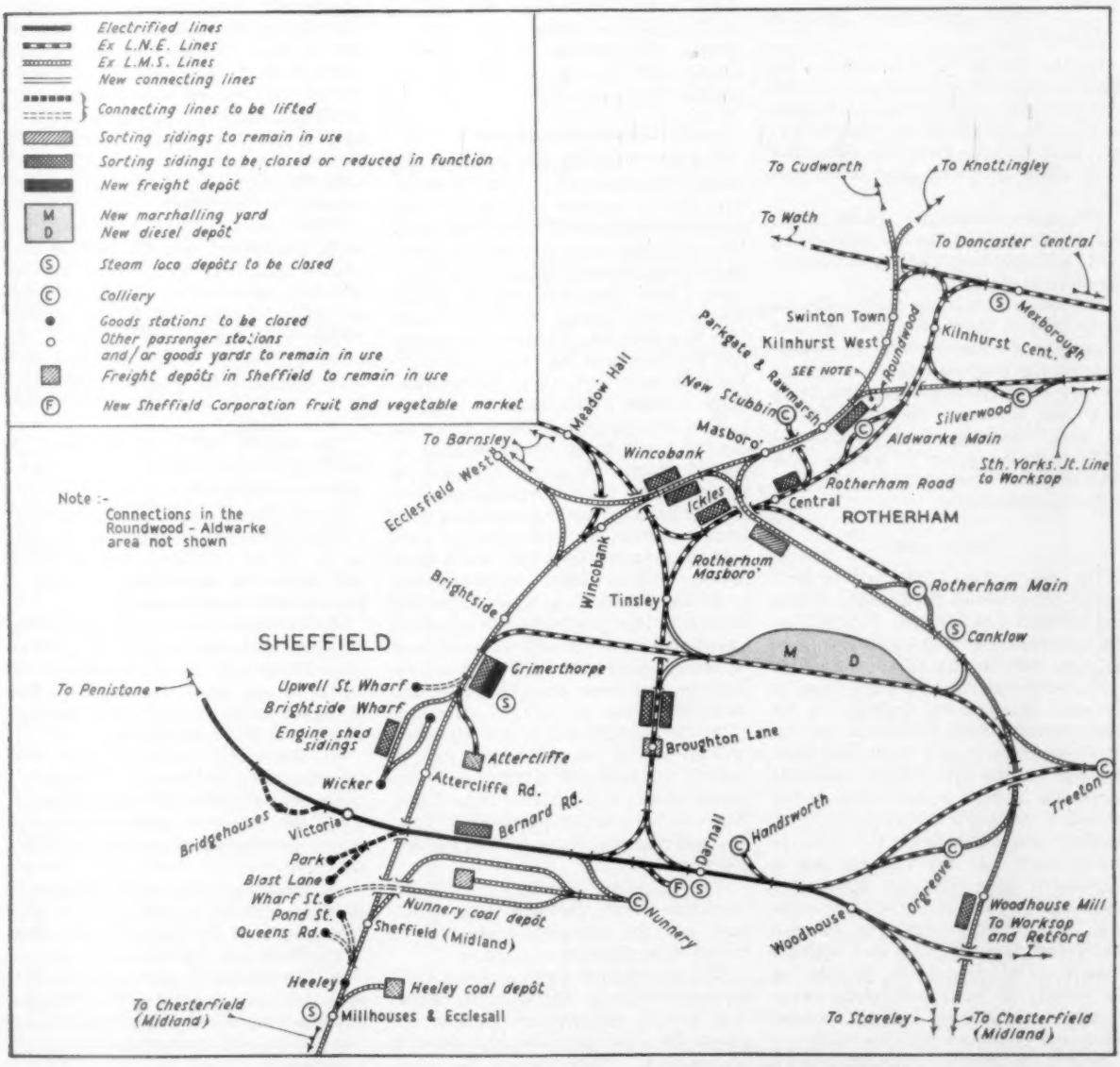
FREIGHT MODERNISATION in the Sheffield area

Eastern Region of British Railways will invest £9 million to improve efficiency

AS BRIEFLY noted in our last week's issue, the Eastern Region of British Railways is about to embark on a comprehensive freight modernisation scheme covering the Sheffield area. The £9-million master plan for a new marshalling yard and diesel depot at Tinsley, and a freight concentration depot at Grimesthorpe, will provide Sheffield with one of the busiest and most modern groups of freight installations in the country. Work is expected to begin in the late spring and be completed by the end of 1964.

Aimed at co-ordination

The scheme is the Eastern Region's answer to the problem of co-ordinating the work at present carried out in 11 marshalling yards, four goods stations and five motive power depots in the Sheffield area. All of these were built by rival railway companies and different ownership impeded the carrying out of any major alterations. Consequently, much of the railway layout and equipment is obsolete, a factor which leads to uneconomic working.



Diagam showing how traffic facilities will be rationalised in the Sheffield area

The concentration of the whole of the Sheffield district under the control of the Eastern Region, in 1957, provided the first opportunity to make a comprehensive analysis of the freight movements and re-plan them on a rational basis.

In 1959 more than 20 million tons of freight, including coal, coke, iron ore, finished steel products and general merchandise, were conveyed from the Sheffield district by rail in nearly two million wagons. During the next five years the expansion of the steel industry in the area and the increased production of coal from the East Midland and South Yorkshire pits are expected to increase these figures. It was against this background that the scheme was planned.

The scheme provides for:—

1. A new marshalling yard at Tinsley;
2. A diesel locomotive depot at Tinsley;
3. A freight concentration depot at Grimesthorpe.

Most of the marshalling work for the Sheffield area will be concentrated at the new yard and nine of the 11 existing small yards will be closed. The remaining two will be used for sectioning work which cannot be done in the new yard.

The diesel locomotive depot, which will be sited alongside the marshalling yard, will enable five steam locomotive depots to be closed.

The work now done at the Queens Road, Wharf Street, Bridgehouses and Wicker goods stations will be concentrated at the new freight depot at Grimesthorpe. A further scheme, still being developed, envisages the concentration on fewer stations of full-wagon-load traffic (mostly carted by traders) now dealt with at 11 other full-load stations in the Sheffield district.

Tinsley yard

The new yard at Tinsley will be built on the north side of the Sheffield district line between Catcliffe and Tinsley. By the construction of four connecting lines, the yard will be strategically placed to sort inward and outward traffic flows in the area bounded by Sheffield on the west, Deepcar and Ecclesfield on the north, Beighton on the south and Mexborough on the east. Two connecting curves will be built at the Tinsley end to provide a westward connection towards Sheffield and an eastward link towards Mexborough. At the Catcliffe end a northwards loop line will enable the yard to service the former Midland main line. The fourth connection, between the former Great Central and Midland lines, is to be constructed—probably in the vicinity of Roundwood-Aldwarke—to give direct running facilities between Wath and Tinsley marshalling yards.

Within the complex industrial area to be served by the yard is a great traffic potential which, for the first time, will be capable of being brought together at one place, thus making it possible to deal with most of it by means of through long-distance trains. As Sheffield is located at the focal point of a number of important freight routes, it will be possible to schedule regular through services to and from London, East Anglia, South Wales, Hull, the North East Coast, Carlisle and Scotland, where modern yards are also functioning or planned. The combined effect of the nation-wide network of modern large marshalling yards is to avoid loss of time which has hitherto occurred in traditional methods of working trains between the multiplicity of small shunting yards.

At present traffic levels, an average of 260 trains will enter or leave the yard daily and some 5,000 wagons will require marshalling each working day.

The yard will be of the most modern type, capable of sorting wagons quickly for the 130 different destinations for which traffic passing through the area requires to be marshalled.

Layout and equipment

The main yard will contain 48 sorting sidings, the secondary yard 26. A secondary yard is required because the large industrial complex in Sheffield calls for at least 130 sorts and a division into main and subsidiary marshalling is most economic. Both yards will feed the sorting sidings through humps over which wagons will be gravitated. Retarding apparatus will give two-stage fully-automatic braking in the main yard. There will be single-stage retarders in the secondary yard.

The yard layout includes facilities for repairing and giving other attention to loaded wagons in transit. It will be equipped with colour-corrected mercury-vapour lights. Two-way radio-telephone communication between shunting locomotive crews and yard staff, and a loudspeaker address system, will be installed.

At the Tinsley end, a new signalbox will control the proposed north and south connecting curves. It will take over work at present performed by Tinsley station junction, Carbrook, Broughton Lane and Attercliffe boxes on the G.C. main line.

At the Catcliffe end, a new signalbox will be built in the marshalling yard to control the yard and in addition engine movements to and from the diesel depot. The existing junction signalbox at Treeton will take over the control of the new north curve.

The signalling installations will incorporate simple train-describing apparatus and the respective areas will be colour-light signalled throughout.

The maintenance depot, which is to be equipped with 24 berths under cover, will provide maintenance facilities for about 270 diesel main-line and shunting locomotives. Deliveries of the locomotives have commenced. The servicing depot, with which is incorporated a locomotive washing machine, is to have four berths and usual equipment and facilities for fuelling, lubrication, inspection and sanding.

The five existing motive power depots which will ultimately be closed after the replacement of steam by diesel power, are Darnall, Millhouses, Grimesthorpe, Mexborough, and Canklow (Rotherham).

The depots are planned to be brought into use in advance of the completion of the marshalling yard. This will enable the savings arising from the replacement of steam by diesel traction to be realised.

Grimesthorpe depot

The Terminal which is proposed for construction at Grimesthorpe will handle approximately 2,000 tons a day.

It is intended to concentrate at Grimesthorpe depot sundries (that is, less-than-wagon-load consignments), warehouse, and wagon-load traffic now dealt with at the Sheffield stations Wicker, Wharf Street, Bridgehouses, and Queens Road. Sundries consignments now distributed by rail between Barnsley, Rotherham, Chesterfield, and Sheffield will also be concentrated at Grimesthorpe and will be collected and delivered by road services radiating to these towns.

There will be 300 tons of sundries traffic for delivery, and 420 tons for collection each day, and loading to 160 principal destinations throughout the country. Concentration of this sundries traffic for loading at one depot will improve the average wagon load and thus save approximately 65,000 wagon journeys a year and eliminate transhipment between depots.

The benefits which are calculated to result from these works may be summarised as under:—

(a) A substantial reduction in the total number of railway installations required in the district. Ultimate rationalisation will reduce the installations to about a third of their present number.

(b) Rationalisation of the yard facilities to eliminate double shunting of wagons in marshalling and the concentration of traffic at the depot for loading, thus giving a great improvement in the average wagon load and journey times.

(c) Elimination of train delays and shunting, and shortening of delivery times on a scale which will greatly improve the service afforded to industrial plants and traders throughout the Sheffield district.

(d) Speeding up movement through the Sheffield area of transit traffic to and from places as far distant as London, South Wales and Tyneside.

(e) Savings in the order of:—(i) 900 staff; (ii) 2,725 wagons; (iii) 27 shunting and trip engines; (iv) 200 cartage vehicles and trailers; (v) Operational savings are expected to amount to about £950,000 annually.

The economics of American diesel traction

A clarification of the statements recently made by Mr. H. F. Brown in a paper to the Institution of Mechanical Engineers in London

A PAPER on the economics of diesel-electric motive power in America was recently presented to the Institution of Mechanical Engineers, London, by Mr. H. F. Brown, an American consulting engineer; it was the subject of an editorial in our issue of December 16, 1960. He has now asked us to allow him to clarify some of his statements and to comment on others made in the editorial.

First, he points out that though his paper is based largely on statistics, "or classified facts for the inference of general truths," it nowhere claims any proofs obtained from statistical data. In search of substantiation for the exorbitant claims made for economies resulting in the general substitution of diesel for steam traction in America, he combed the best and most complete statistics obtainable in order to study the comparative economics of all types of motive power. To do so he brought to bear an engineer's scrutiny to ascertain the causes of any changes. It was thus possible to assemble in graphical or numerical form all pertinent motive-power statistics covering a period of years. He now invites anyone differing from his views to make different deductions and inferences from the statistics, if he can do so, but he emphasises that these statistics were not hand-picked to prove anything.

Claims for diesel economy

Mr. Brown then reiterates the following among the all-embracing claims made for economies resulting in the change to diesel power in the U.S.A. after 1950, namely:—

(1) That each diesel can replace and do the work of two steam locomotives.

(2) Diesels in multiple-unit reduce the numbers of trains due to their greater power; large savings in wages are claimed on this account.

(3) They have greatly increased speeds and have generally reduced repair costs.

(4) On their capital cost they have effected operating savings of up to 30 per cent annually after interest and depreciation charges.

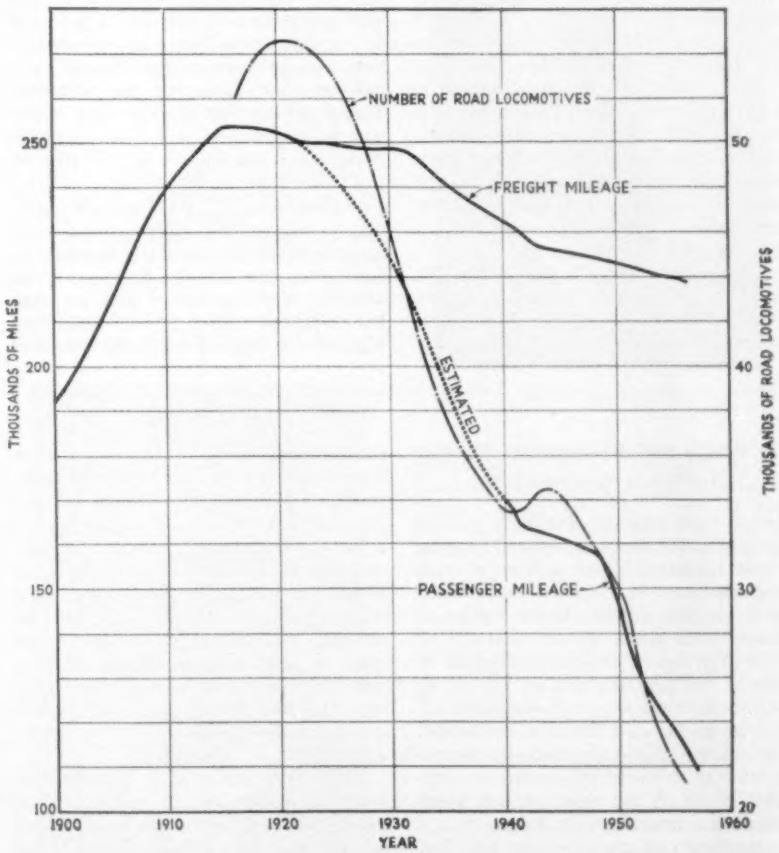
(5) They have enabled railways to increase their dividends.

The paper flatly states that not one of these claims could be substantiated from the statistics, and instead shows the more probable cause of the trend giving rise to such claims. Mr. Brown firmly believes that a far more important and drastic reason has been the reduction in mileage worked due to the loss of branch lines and short-haul traffic to the highways. It is undeniable that this factor has been operating since 1920, except during the war years, whereas change in type of motive power to diesels has been of significance only since the war.

Another claim which Mr. Brown vehemently refutes is that the drop in the number of steam locomotives from a peak in 1924 was the result of the introduction of diesel shunters in 1925. Actually the peak year was 1920, from which a rapid fall ensued, and during the decade 1925-34 only 97 shunters and no other diesels were placed in service. A careful study of statistics shows that not until well after 1940 were there sufficient diesels running even for shunting service to have appreciable effect on the general economy of the Class I Railway. These facts are clearly shown in the diagram reproduced. There is little evidence that change in type of motive power has noticeably affected the rate of decline since 1940, but the increase in steam locomotive unit capacity after 1920 undoubtedly accelerated the earlier decline.

Importance of draw-gear strength

As to diesels in multiple-unit hauling longer and fewer trains, some credit must be given to American railway management ever since the days of the 1914-18 war for operating trains up to the limit of safe draw-bar capacity. Steam trains in 1925 were just as heavy as those in 1955 with diesels. The diesel has not changed the draw-bar capacity of cars



Graph showing consistent fall (except during war years) in number of "road" (main-line) locomotives in service on American railways, 1922–57, both before and after introduction of diesels

that are, on the average older than the diesels. This claim is a pleasant subterfuge to disguise the necessity for multiple-unit operation because the diesel locomotive units in the U.S.A. have been for years too small in capacity. Ton-miles per train-mile have increased mainly because of the loss of the shorter trains.

The same reasoning can apply to increased train speeds. Train-miles per train-hr. have naturally increased after the loss of the slower branch-line and local traffic which went into the aggregate of train-miles and train-hours used in calculating the average. It is not denied that there may be a few more "fast" trains today, but fast trains were no faster in 1960, because of diesels, than they were in 1920, with steam power.

Train-miles per year and train-hours per year, when carefully examined, show the same general patterns exhibited with decline in route-mileage and main-line motive power. All of these factors serve to cast considerable doubt as to the economies to be derived from them, because the change in type of motive power does not appear to be a prime cause of any of them.

Economic life of diesels

Mr. Brown feels that the statement in the editorial that the author's "argument depends for its soundness largely on the fact that main-line diesel-electric locomotives in the United States mostly are *allowed* an economic life *limited* to about 11–16 years," and that "the customary re-engining and so on which takes place within this span necessitates the unit being reclassified as new and treated as such from the accounting point of view," is not quite accurately stated.

It is conceded that the short life of the diesel, combined with its high first cost, is a very important part of the economic argument presented.

There is nothing "allowed" or "limited" relative to the operation of any type of motive power on the railways of the United States, other than the cost of keeping it in good, safe operating condition. If a railway elects to spend the entire original cost, or more on a special locomotive in one repair operation, it may do so. The costs, however, must go into the proper accounts.

Typical example of diesel life

A 1,350-h.p. diesel freight unit purchased in 1945 for $125,000 had one heavy overhaul in 1951 costing $35,000. Running repair costs were steadily rising and it now needs complete rebuilding including re-wiring throughout, new control equipment, the rebuilding of the engine and the reinsulation of the motors and generator with more modern materials. Such rebuilding is beyond the capacity of the railway, but the manufacturer agrees to buy the locomotive back for $25,000. This re-sale eliminates trouble with the railway unions demanding the right to do the work. The manufacturer further agrees to rebuild the unit as a 1,750-h.p. general-service locomotive with one-third more power, and to sell it to the railway as a modern unit in every respect with the same one-year guarantee as a new unit, at a cost of 15 per cent below that of an entirely new unit because some of the original parts will be used again, or for $170,000. Before selling the original unit which was purchased under an "equipment trust agreement," the railway has to pay off the balance due to the "trustee owner" by withdrawing $23,000 from the depreciation reserve fund. These transactions and the replenishment of the depreciation reserve together with the financing of the virtually new locomotive may be what the editorial terms "well-established high finance juggling methods," but they were not invented by the writer of the paper to assess and compare the results obtained with different types of motive power. It is a very real and growing problem facing U.S. railways today. By the end of 1959 the number of diesels scrapped had reached 3,100 units or equal to the number purchased 14·5 gr. previously.

In the author's final comparison of actual costs, 97 per cent diesel, for 1957, compared with hypothetical steam costs, the editorial states that he has apparently overlooked in his comparison of equivalent horsepower the greater tractive efforts for starting and for reduced speeds on steep gradients where high average speeds are to be maintained, and that this "serves to emphasise the danger of assuming a generalisation from the comparison . . . which might erroneously be thought to apply for instance to railway investment and operation in Britain."

When it is considered, however, that the *average* rate of usage of motive power on the Class I railways of the U.S.A. in 1957 was only 40 per cent, and 38 per cent in 1958, it should be apparent that the general comparison made between the investment required for steam could have been calculated much more favourably than was done.

Actual costs

Regardless of such details, however, the total *actual* costs, including proper depreciation and interest charges, was over two billion dollars for 97 per cent diesel operation in 1957. It would be a real statistical and engineering feat to make estimates showing that equivalent modern steam power of the same average age as the diesels would have cost one billion dollars more than the actual costs incurred. This would have to be done to justify the economic claims made for the diesel.

The design and development of bogies

Continued from page 308

load and air pressure should be at least similar to what could be ensured by using a separate set of helical springs, at each load, designed to keep the natural frequency constant. Apart from air pressure and auxiliary tanks, the characteristics of air springs can be favourably affected by altering the effective area of the spring with load, this being of considerable advantage as far as stiffness is concerned. The interpretation of air spring characteristics in conventional terms is indicated in fig. 5, the right part of which relates to a typical vehicle unit.

Damping can present difficulties for, apart from a few attempts in other directions, the air spring must rely mainly on the use of hydraulic dampers. The conventional hydraulic damper is generally satisfactory with conventional springs with which the stiffness remains constant and only the supported mass is altered. In this case, damper effectiveness expressed in terms of damping factor D will be reduced as mass increases, but relatively slowly (Fig. 6). With air springs, both the spring stiffness c and mass m are increased simultaneously, and the value of D will fall much more rapidly. Because of this, great care is called for when chosing optimum characteristics.

It might be desirable to employ load-sensitive dampers by setting, for example, the control valve of the damper in accordance with the air pressure in the spring system, or by making use of the air flow between spring and auxiliary reservoir. Body roll rate is another problem.

The change of state resulting from dynamic load adjustments of the springs is adiabatic, while roll stiffness is isothermal and therefore only about 70 per cent of the former (Fig. 5). Because of this, something must be done about roll stability.

The control equipment requires attention particularly as far as sensitivity and resultant air consumption arising from the levelling valves is concerned. It would appear that, in the past, air suspension occasionally suffered from the fact that vehicle builders had to rely on three distinct groups of accessory makers supplying spring units, dampers, and control equipment, respectively, without ensuring the necessary close matching of components in terms of vehicle suspension characteristics.

To be continued

PERSONAL

Overseas

MR. D. H. C. DU PLESSIS, General Manager, South African Railways & Harbours, who, as recorded in our issue of March 10, has retired, was born on March 12, 1898, and entered the railway service as a clerk at Johannesburg on June 10, 1915. He served successively in the then Assistant General Manager's and General Manager's staff offices until 1931, when he was appointed to the post of Supervisor, Transport Commission, Johannesburg, in which position he formed a liaison between the South African Railways and the Central Road Transportation Board. In 1934 he became Secretary to the Railway Board, and served the Minister of Railways & Harbours and the Railway Board in that capacity until 1937, when he returned to Johannesburg as Superintendent (Parliamentary). In 1939 he was appointed System Manager, Bloemfontein, and four years later was promoted System Manager, Johannesburg. In October, 1945, he was made Chief Harbour, Shipping & Development Manager, and he became Chief Staff Manager in February, 1949. In February, 1950, he was appointed Deputy General Manager, and General Manager in 1952. During 1929/30 Mr. du Plessis served as a member of the secretariat of a commission appointed by the Government to enquire into the question of road motor competition with the Railways. The findings and recommendations of this commission formed the basis of the legislation passed by Parliament in 1930 under which machinery was set up for the control and co-ordination of all forms of transport in South Africa. In 1934 Mr. du Plessis was secretary to the international commission which, under the Chairmanship of Sir Guy Granet, investigated the working of the South African Railways. In 1947 he was appointed a member of a Royal Commission to report on railway operation in Western Australia. In 1946 Mr. du Plessis led the S.A.R. mission, representative of all the main departments, which visited the United Kingdom, Sweden, Switzerland, Holland, Belgium, Canada, the U.S.A., Argentina and Brazil for the purpose of undertaking a detailed study of the latest trends in transport developments.

Mr. D. H. C. Du Plessis

MR. J. P. LOVEGROVE, Assistant Public Relations Officer, East African Railways & Harbours, has been appointed Public Relations Officer.

MR. W. R. HEMMING, Advertising Sales Manager, Victorian Government Railways, has retired. The Advertising Division has now been placed under the joint control of MR. K. V. WHITBY, in charge of administration and MR. J. RENWICK, in charge of sales promotion.

MR. S. P. LAL, Chief Commercial Superintendent, North Eastern Railway, India, has been appointed Chief Operating Superintendent, Northern Railway.

MR. C. D. JAMES, head of Colonization & Agriculture Department, Canadian National Railways, has been appointed Associate Manager, Passenger Sales Promotion Department.

MR. J. P. HUGO, Deputy General Manager, South African Railways & Harbours, who, as recorded in our issue of March 10, has been appointed General Manager, was born at Fauresmith, in the Orange Free State, in 1907, and joined the Railway service as a clerk in 1927. He served at various stations on the Natal System before being transferred to the Railway Service Commission, Pretoria, in 1936. He was transferred to the General Manager's Office, Johannesburg, in 1940, and, in 1944, he returned to Pretoria as Secretary to the Railway Service Commission, in which capacity he served until 1949, when he was appointed Superintendent in the General Manager's Staff Office at Johannesburg. During 1950 Mr. Hugo was retransferred on promotion to Pretoria as Administrative Secretary to the Minister of Transport. He served in this capacity until he was promoted to the position of System Manager, Windhoek, South-West Africa, during 1952. Mr. Hugo was appointed Chief Superintendent (Staff), in 1954, and Deputy General Manager in 1959.

Mr. J. P. Hugo

MR. R. A. GORDON, Assistant General Manager, Express Department, Canadian National Railways, who has been appointed General Manager, Express Department, joined the C.N.R. in 1924, and has held many important posts in that Department across Canada, since that time. In 1943 he was appointed Traffic Supervisor, Express Department for the Atlantic Division, and the following year became Assistant Superintendent at Moncton. He was appointed Superintendent in 1948, and, in 1950, transferred to Winnipeg as General Superintendent. Mr. Gordon moved to Montreal as Assistant General Manager of the Department in 1951.

Mr. R. A. Gordon

Industrial

The Locomotive & Allied Manufacturers' Association of Great Britain, has announced the re-appointment of THE RT. HON. THE VISCOUNT CHANDOS, Chairman, Associated Electrical Industries Limited, as President of the Association, and MR. G. COLLINGWOOD,

Managing Director, The Vulcan Foundry Limited, as Chairman of the Association, for the ensuing year.

MR. A. MCKELLAR has joined the board of Bruce Peebles & Co. Ltd.

MR. E. WOOD has been appointed Home Sales Manager of Robert Hudson Limited, Leeds.

MR. G. COOKE has been appointed to the position of Group Publicity Director of the Firth Cleveland Limited group of companies.

MR. P. LAMBERT has been appointed head of the Engineering Section, British Steel Casting Research Association.

MR. P. J. DAGLISH, Special Executive, D. Napier & Son Ltd., has been appointed to the board as Commercial Director.

MR. J. H. CLARK, Small & Parkes Limited, has been appointed Automotive Sales Representative in the Edinburgh area.

MR. F. TUTEIN, Overseas Technical & Sales Manager, Siemens & Halske A.G., Brunswick, Germany, has retired. He is succeeded by MR. H. AHLGRIMM.

MR. W. R. L. WARNOCK, a Director of Rockwell Engineers Limited, has joined the board of the Coventry Gauge & Tool Co. Ltd., the parent company.

MR. E. J. ELLETT, Philips Electrical Limited, has joined the sales force of the South East Region and will be concerned with selling sound equipment installations.

MR. H. F. SPENCER, Managing Director, Richard Thomas & Baldwins Limited, has accepted the appointment as President of the British Iron & Steel Research Association in succession to the late SIR CHARLES BRUCE-GARDNER.

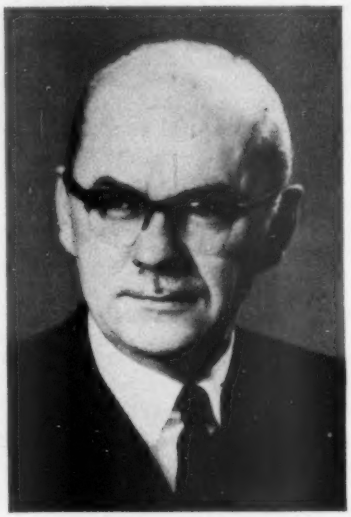
MR. A. CROCKETT has been appointed to the board of the Brooke Tool Manufacturing Co. Ltd. Mr. J. Lamb, Chief Accountant of the Brooke Tool Manufacturing Co. Ltd., has been appointed a Director and Chief Accountant of the company's wholly-owned subsidiary Brooke Tool Automation Limited.

Small & Parkes Limited has announced the following appointments: MR. G. DUKE, the well-known racing motor-cyclist, to be Distributor, DON Automotive Products, Isle of Man; MR. K. S. SEAL to be Senior Representative (Automotive Products), South Wales Area; MR. A. V. WALKER to be Depot Manager, Cardiff & Swansea.

Associated Electrical Industries Limited has announced that its Rectifier Engineering and Semiconductor Engineering Departments of the A.E.I. Heavy Plant Division have been combined to form a single new department with the title of Power Rectifier Engineering Department. The following appointments have also been announced: DR. J. C. READ, Manager, Rectifier Engineering Department to be Divisional Consultant, Rectifiers, and MR. W. D. SINCLAIR, Manager, Semiconductor, Engineering Department, to be Manager, Power Rectifier Engineering Department.

British Railways

MR. S. F. COX, F.I.C.A., Assistant Accountant, British Railways, Western Region, who, as recorded in our February 24 issue, has been appointed Chief Accountant, Eastern Region, was educated at Kelly College, Tavistock and was articled to a London firm of Chartered Accountants, qualifying in 1935. For the next four years he was engaged on auditing and financial investigations with a leading firm of accountants. From 1939–48 he worked as a Chief Accountant in the light engineering industry and in 1948 was appointed Divisional Accountant, North Western Division, Road Haulage Executive, Manchester. In 1950 he became



Mr. S. F. Cox

Finance Officer (Accounts & Audit), British Road Services, Marylebone, a post subsequently redesignated Finance Officer. Mr. Cox has been Assistant Accountant, Western Region, since 1955.

MR. C. W. BURNETT, Acting District Engineer, Irvine, British Railways, Scottish Region, has been confirmed in that appointment.

MR. W. G. SALMON, Divisional Shipping Manager, Southampton-Weymouth, British Railways, Southern Region, has retired. He is succeeded by MR. A. L. PEPPER.

MR. D. COOK, Assistant Director of Studies, British Transport Commission Staff College, Woking, who has been appointed Public Relations Officer, Great Eastern Line, Liverpool Street, British Railways, Eastern Region, was educated at Northgate School, Ipswich and London and Cambridge Universities, graduating from Queen's College, Cambridge with first class honours. During the war he served in the R.A.F. as a Squadron Intelligence Officer and later with the Missing Research & Inquiry Service. In 1950 he joined the London Transport

Mr. D. Cook

Executive in the Public Relations Department becoming personal assistant to the Chief Public Relations Officer, and later, to the Chairman. He attended the Administrative Staff College, Henley, in 1956, after which he moved to the Central Road Services Department. He was in charge of Rye Lane Garage when, in May, 1959, he was appointed to the position which he now vacates.

MR. D. H. COOMBS, Assistant Engineer (Permanent Way), Chief Civil Engineer's Department, Glasgow, British Railways, Scottish Region, has been appointed District Engineer, Glasgow North.

MR. J. W. WALKER, Senior Clerk, General Section, Office of General Manager, York, British Railways, North Eastern Region, has been appointed Assistant to General Manager (General).

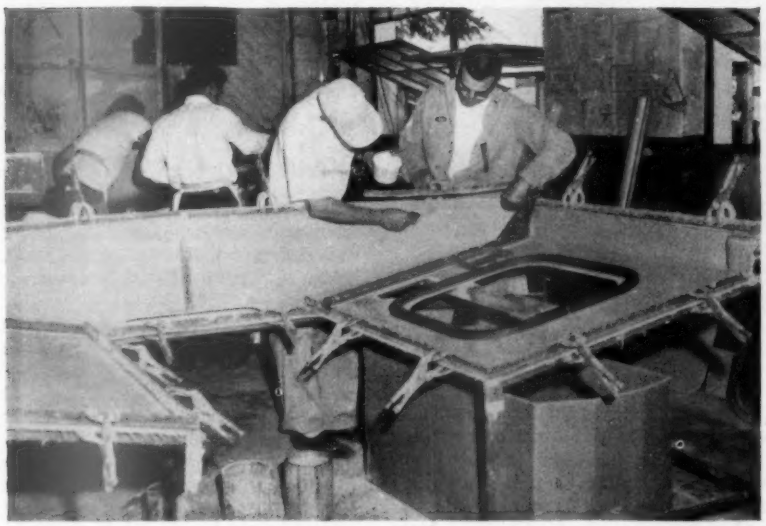
Trade Union

MR. W. J. P. WEBBER, General Secretary of the Transport Salaried Staffs' Association, is to be one of the five members of the Royal Commission on the Press, under the Chairmanship of Lord Shawcross.

Obituary

We regret to record the death of Mr. Edwin Harold Davies, O.B.E., formerly Assistant Chief Commercial Manager of the London Midland & Scottish Railway. He was in his 92nd year. Mr. Davies, who was born in the Liverpool area, joined the railway service as what was then known as a "superior apprentice." He was responsible for a number of innovations on the commercial side of railway activities and was one of the comparatively few people to have been given a gold pass. During the 1914-18 war he was appointed Controller of Coal under the then Ministry of Munitions, for which work he was later awarded the O.B.E. He retired from railway service in 1928.

NEW EQUIPMENT *and Processes*



COACH BODY CONSTRUCTION

in Fibreglass Reinforced Plastic and Stainless Steel

The use of fibreglass-reinforced polyester plastic combined with stainless steel has been developed by the Hooker Chemical Corporation in conjunction with the Budd Company for coach body construction in the U.S.A. This form of construction has been applied to 270 coaches recently introduced on the Market-Franksford subway-elevated line, 12·8 miles in length, operated by the Philadelphia Transportation Company.

The main centre portion of the coach body is designed as an integral structure in stainless steel to form a load-carrying girder. The end sections are moulded in fibreglass, reinforced plastic, Hetron (R) 353, which is a fire-retarding, corrosion-resistant polyester resin. The two end sections are of the same basic design, but with certain variations, and it was possible to use a single basic pattern mould, arranged with replaceable sections to suit the required variations. This achieved a saving in tooling costs.

Finishing

An unusual feature is that the production of the final finish is the first step in the manufacturing process of the plastic end sections. This finish, which is sprayed on to the mould, consists of a gel coating, in which a stainless-steel grey pigment is dispersed in the resin. A permanent colour is thus produced, which blends with the exterior surface of the stainless-steel portion of the body.

After the gel coating has set, successive layers of fibreglass mat are placed in the mould and impregnated with the Hetron resin, which has been catalised with methyl-ketone peroxide, until the required thickness has been reached. Portions of fibreglass may be added in places where greater thickness is required without increasing the thickness of the whole structure unnecessarily.

The completed laminate, after polymerisation, is then removed from the mould for the next stage, which consists of cutting out windows, drilling and counter-sinking fixing holes, moulding in stainless-steel inserts, and bonding fibreglass strips to the shell with epoxy resin ; this provides additional rigidity.

The shell is then placed on a fixture representing the mounting structure of the coach to check the correct location of the inserts and the accuracy of the inside dimensions. The manufacturing process is completed by moulding on, drilling, and cutting out the marker light housings.

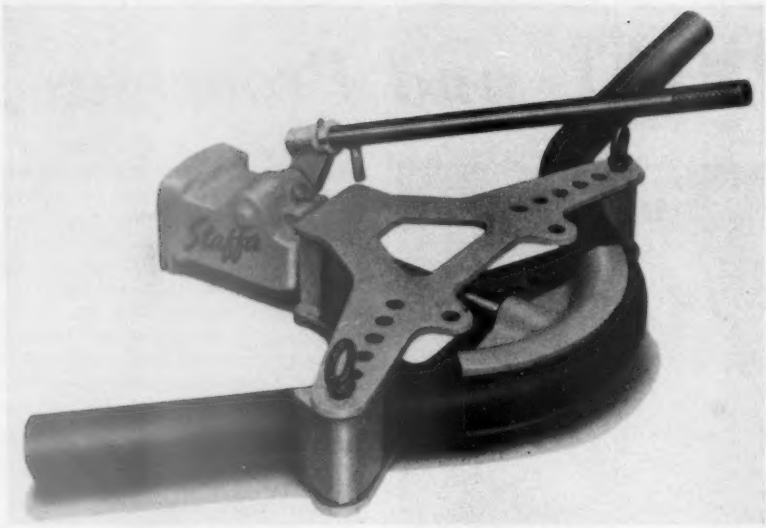
The principal advantages claimed for the combined stainless-steel and fibreglass reinforced plastic type of construction are:—

Low tooling costs;
Short manufacturing time;
High strength/weight ratio;
Effective resistance to fire, abrasion, fracture, denting, wear, and corrosion;
Elimination of painting costs and reduction in maintenance.

The complete body structure has been compression-tested with a static end-load of over 200,000 lb. without permanent deformation, while the floor will carry a load exceeding 275,000 lb. before collapsing. Compared with all-steel coaches, the new coaches represent a 12 per cent saving in weight, resulting in an appreciable reduction in power consumption costs.

Of the 270 coaches concerned, 46 are single units with a cab at each end and a complete set of power and braking equipment; the remaining 224 are formed into two-car units, with a cab at each end of the unit.

Further details may be obtained from Hooker Chemical Corporation, Box 344, Niagara Falls, N.Y., U.S.A.



HYDRAULIC PIPE BENDER

A 1½-in.-capacity, hydraulic three-point bending machine has been introduced which bends nominal-bore steam and gas pipes up to 1½ in. in dia. The bender, which has been designated the "B.2" and which does not require a bench or stand, consists of a powerful hydraulic pump ram unit, a forming head assembly, and centre formers for ½ in.–1½ in. nominal bore pipes to BSS. 1387.

The whole assembly, complete in a wooden case, weighs 110 lb. It is said to be capable of putting a 90-deg. bend in a 1½ in. pipe in 60 sec. A feature of the machine is the angle-of-bend indication marks cast in one end of the formers which provide a guide during the bending operation of all pipe sizes within the capacity of the machine.

The price of the complete machine, including formers and case, is £35, and it is claimed that the machine will recover its cost in a very short time.

Further details can be obtained from the manufacturer, Chamberlain Industries Limited, Staffa Works, Argall Avenue, Leyton, E.10.

PACKAGING AND BOTTLE-HANDLING

New packaging and bottle-handling products to be shown at the forthcoming International Packaging Exhibition at Olympia will include the "Airline" air-jet dry cleaner for handling up to 1,500 dozen narrow-necked bottles an hour; the "Speedline," a high-output stainless steel slat conveyor (Thomas Hill Engineering Co. (Hull) Ltd.); Seekure and Pyrokure reinforced papers (J. H. Sankey & Son Ltd); an automatic machine which fills and seals between 25 and 40 paper or Cellophane bags in a minute (Convertex Machinery Limited); an automatic gluing and taping machine, self-adjusting to accept cases of varying dimensions in any order at the rate of 4 to 12 per min.; a unit-filler which automatically opens flat cartons of neck-widths between ⅜ and 10 in. and, after inserting the contents (which can include instruction leaflets), seals them by gluing or tucking in the flaps at both ends (Frederick C. Kane Limited); a range of polythene caps for glass, aluminium, or plastic tablet-containers, with internal neck diameters between 0·19 and 1·57 in. (Flexile Metal Co. Ltd.); a metal beer container, washer and steriliser (Dawson Bros. Ltd.); a combined dispensing and sealing device (Imgo Research & Development Company); anti-moisture metal-ended fibre drums (Venesta Plywood Limited); and sack-sealing equipment (Thomas C. Keay Limited).

HIGH-SPEED DERRICKING UNIT

An independent high-speed derrick unit and new swing brake are now available for Smith "12" excavators and crawler cranes. These two units will enable the crawler-mounted machine to hoist, slew and derrick simultaneously, and, if used in conjunction with a special planetary-load-lowering drum unit, will complete the equipment for transforming the "12" into a sensitive precision crane.

The derrick unit comprises a totally-enclosed worm-driven drum unit powered from the first machinery shaft by spur-gearing through a pair of friction clutches, all encased and using the basic machinery oil flow for lubrication. Also incorporated in the design is an automatic brake fitted with an interlock device to prevent the clutches being applied should the brake become out of adjustment. The control for the independent derrick unit is of the dead-man's-handle type, the whole system returning to safety in the event of the operating hand lever being released.

The hand-operated swing brake is fitted to the first-machinery-shaft clutch disc, which controls the drive to the slewing motion. This brake, of twin-shoe construction operated by overcentre control, is very light in operation, but sufficiently powerful to hold the machine on any slope.

Further details can be obtained from Thos. Smith & Sons (Rodley) Limited, Crane Excavator Works, Rodley, Leeds.

LIQUID OXYGEN EQUIPMENT

Under a new system, liquid tankers, fitted with electrically-operated pumps, will deliver liquid into an evaporator in consumers' works at pressures up to 300 p.s.i.g.

Vacuum-insulated evaporators have been designed and manufactured and existing cold evaporators are being modified to take pressure-filling. The system will be extended to include liquid nitrogen and liquid argon.

Fresh supplies of liquid can be pumped in without interruption of customer's demand. The pump-filling operation is twice as fast as the conventional decanting method. The plant is entirely automatic and maintains a predetermined pipeline pressure. It does not need a plant hand in attendance.

Increased efficiency of the insulation will provide greater storage in many cases, and plants can be installed out of doors.

Further details can be obtained from the British Oxygen Gas Co. Ltd., Bridgewater House, St. James's, London, S.W.1.

AUTOMATIC PROFILE POLISHING

The Morrisflex-Hammond Type "CFT.40" machine is designed for the automatic polishing of profiled components, such as vehicle window-vent frames, clock bezels, profiled metal beadings, and shaped strip surrounds.

The work is held on a quick-action jig, which incorporates a chain drive following both concave and convex contours. When the jig is engaged in the variable-speed drive sprocket, it traverses through its whole length against the polishing mop, or abrasive hand attachment.

Generally, only one polishing head is used, with liquid compo feed arrangement. The standard table size is 40 in. x 30 in., but this can be extended by outrigger sections. A pair of machines can also be coupled for two-pass work.

It is claimed that this machine is particularly suitable for regular small-run work, where the expense of a large-capacity automatic plant would not be justified, and for dealing with components of awkward lengths or shapes.

Further details may be obtained from B. O. Morris Limited, Morrisflex Works, Briton Road, Coventry.

Institution of Railway Signal Engineers

Discussion on paper by Chief Signal and Telecommunications Engineer

At the February meeting of the Institution of Railway Signal Engineers, Mr. A. W. Woodbridge, Chief Signal & Telecommunications Engineer, British Transport Commission, read a paper entitled " Experience with the British Railways standard electrification system with particular reference to signalling and communications." A brief account of this paper was given in our February 10 issue.

Opening the discussion, Mr. E. G. Brentnall, Signal Engineer, London Midland Region, British Railways, said that three types of track circuit were in use on the London Midland Region: the d.c. protected, the a.c. 75-cycle with static frequency conversion equipment, and the a.c. 83⅓-cycle to which Mr. Woodbridge had made reference. In three cases the 83⅓ system was in service : at Piccadilly Station Manchester, where d.c. and a.c. traction were in simultaneous operation; at Crewe, d.c. equipment was converted to a.c. and at Liverpool 50 cycles were converted to 83⅓.

Problems and their solutions

Mr. Brentnall detailed the problems met with the several types of track circuits and the methods used to overcome them. To protect signal control cables from induced voltages, line circuits are cut-sectioned to conform with maximum longitudinal voltages of 110 and 430 V. On the Crewe–Manchester line, a maximum of 1,400 yd. was allowed between cut section points, and on the Crewe–Liverpool line cut sections were at 2-mile intervals.

Preliminary results indicated that spacings are adequate for prevailing conditions. Mr. Woodbridge had stated the most pressing need at present to be the determination of maximum traction loads. So far, all tests had been made with simulated conditions or a limited electric service running and systems tests only gave a partial result until full traction current conditions were obtained with heavy trains hauled by locomotives and most of the multiple-unit trains running at the same time.

Mr. R. A. Green, Signal Engineer, Eastern Region, British Railways, thought Mr. Woodbridge's paper had produced a very useful assembly of available data, and that full results of the tests would provide a valuable reference for future work. He would like to know what exactly was the end-product of the systems tests. He thought the track circuit problem straightforward, for the main interest lay with the current taken by one train on an occupied track circuit. With telecommunications circuits the concern was with formation of current in the catenary system. He thought this was the greatest problem at present. Signalling problems had been solved, but on the telecommunications side they were going to be concerned with interference particularly where circuits were not entirely confined to electrification areas. He referred to several methods of cable protection designed to reduce interference and believed that additional maintenance costs must be incurred for the telecommunication circuits and an increase in staff for quicker fault rectification.

Well-designed equipment

Mr. L. M. J. Knotts, formerly Signal Engineer, Scottish Region, British Railways, and now Technical Adviser to Mullard Equipment Limited, said that those who had worked on the design of the cables and equipment should be congratulated. He thought that in future works better and more economical results would be obtained by suppressing interference at source rather than taking preventive measures with the equipment.

Dr. A. Rosen, of British Insulated Callenders Cables Limited, spoke on the limits of induced voltages and staff safety precautions.

Mr. Woodbridge agreed with Mr. Brentnall that some of the figures given required checking and this was customarily done. He referred to the limitation of track-circuit lengths and said that if a 600-yd. track circuit could be operated, an advantage would be gained though a length of 1,000 yd. was required. It was claimed on the Continent that track circuits 2 km. in length were in use. These were of electronic design.

Replying to Mr. Green, Mr. Woodbridge said the end product of systems tests was to prove that theories were correct and provide a reasonable formula on which to base future calculations.

Tenth Electrical Engineers' Exhibition

A total of 57 countries will be represented at the opening ceremony and official luncheon on March 21 of the tenth Electrical Engineers' Exhibition. This is the largest number of foreign dignitaries to be present at the opening of any trade show in Britain. Over 470 of Britain's leading electrical manufacturers will represent the country's electrical industry.

The exhibition will be opened by the Minister of State, Board of Trade, the Rt. Hon. Mr. Frederick Erroll, at noon on March 21.

The special feature this year is " Signalling & Communications " presented by the General Post Office and the British Transport Commission.

For the first time at any exhibition the G.P.O. has laid on international communications to all parts of the world. There will be complete telephone, telegraph, and telex services.

The British Transport Commission display covers signalling and telecommunications equipment representative of standard apparatus used in modern installations designed to reduce maintenance to a minimum.

One of the highlights of its display will be an electro-magnetic railway level-crossing barrier. Made by Rotax Limited, it will cross a section of full-size switching track.

Visitors will be able to operate the barrier, which in every-day operation sounds an electric two-tone gong, audible from up to 300 yd. This will be the first time that this barrier has been on show.

A length of platform, incorporating latest station lighting developments, will run alongside the track.

Mounted on the first floor will be the world's largest moving coil meter, which is about 17 ft. square. The meter scale will be more than 20 ft. long, and it will show the total electrical load connected during the exhibition. The movement and dial have been designed and constructed by Nalder Bros. & Thompson Limited.

Radar fault locator

An a.c. radar fault locator, the product of Ferranti Limited, which operates on the radar principle of pulse reflection, will also be displayed for the first time at the Exhibition.

Recent discoveries by Thorn Electrical Industries Limited have brought electroluminescence one step nearer reality. The lighting illuminates whole metal sheets by the use of phosphors, which light up when an electric current is passed through them. No filaments are needed.

Some of the new plates can be seen at the Exhibition on the stand of a Thorn subsidiary, Atlas Lighting Limited, which also has designed an unusual lighting feature for the entrance foyer).

Questions in Parliament

Coastal shipping and internal transport

Mr. Hector Hughes (Aberdeen N.—Lab.) asked the Minister of Transport on March 8 if he was aware of the need for co-ordination between Great Britain's shipping coasting trade and Great Britain's internal transport system ; and what are his plans for achieving such co-ordination.

Mr. Marples replied that the matter was bound up with the current examination, referred to in paragraph 60 of the White Paper, " Reorganisation of the Nationalised Transport Undertakings." (Cmnd. 1248).

Mr. Hughes asked if the Minister realised that, owing to the diverse nature of the merchandise carried in this country, there was a conflict between the different transport services which could be resolved by a little intelligent planning.

Mr. Marples told him if he had any views about coastal shipping and would care to put them forward, he would be glad to receive them.

Mr. G. R. Strauss (Vauxhall—Lab.) pressed for a decision and was told that the Council of Shipping, in its recommendations made quite recently, on which it spent 18 months, mentioned this problem and had asked for restrictions on road and rail so that coastal shipping could take a certain amount of traffic at appropriate rates. This was being examined.

Unmanned railway crossings

Mr. George Jeger (Goole—Lab.) asked the Minister of Transport on March 8 whether he was aware of the danger to the public arising from unmanned railway level-

crossings; and what steps were being taken to install automatic safety devices and warning signals at such places.

Mr. Marples, in a written answer :—There were two types of unmanned railway level crossing, namely, public and private. At public level crossings, which were mainly on light railways, the evidence was that there was little danger. At some private crossings the risks had increased because of an increase of road traffic. He had no powers to order the installation of additional protection at such crossings, but the British Transport Commission, by agreement with the users, had provided warning arrangements at some of them.

Parliamentary Notes

Late train complaints

Mr. J. B. Simons (Whitehaven—Lab.), on the motion for the adjournment at midnight on March 7, drew attention to the lateness, on many occasions, of the early-morning workmen's train, leaving Barrow at 6 a.m. due at Sellafield at 7.11 a.m. during the last 18 months.

Mr. Marples said he was glad that Parliament had laid it down that it was not the Minister's business to interfere with train services. The course followed in making representations to the District Traffic Manager had been the correct one. The General Manager of the London-Midland Region could have been approached and also Sir Brian Robertson. Another way was to go to the appropriate Transport Users' Consultative Committee.

The Minister added that he had made some inquiries about this train, and found that it was an unadvertised train. It was a ghost train not mentioned in the time-tables, and most of the passengers were employed by the Atomic Energy Establishment at Sellafield. This train stopped at all stations, and its time for completing the journey was 71 minutes. The main causes for delays were operating. Another reason was that owing to heavy rains, a culvert had collapsed at Askam.

Transport Debate in the Lords

In the House of Lords on March 13, Lord Teynham, opening the debate on Nationalised Transport Undertakings foresaw one or two main railway lines running North and South, and one East and West, with most of the branch lines closed. Feeder services would be provided by buses, subsidised on uneconomic routes. At this point Lord Teynham declared his interest as a Director of a bus company. He doubted the railways' ability to pay their way in five years' time and suggested that there was no alternative to subsidising certain essential railway services. He congratulated Sir Brian Robertson on the great work he had done, under immense difficulties which he attributed to the 1947 Transport Act. Reference was made to wasted shipping and a Government policy requested for this form of transport before legislation was given granting greater commercial freedom to railways.

Lord Morrison of Lambeth pointed out that, as in 1947 when profitable road transport was cut off from the British Transport Commission, other profitable elements were now being removed from British Railways. He advocated grants for such things as permanent way and compensation for lines which were not abandoned because of Government requests.

Scottish point of view

Lord Hughes, speaking for Scotland, said that people there would be without railway services of any kind if the practical test was users ability to pay economic prices for services as mentioned in the White Paper and the bus services had already been abandoned as uneconomic.

Lord Molson did not find a great deal to criticise in the White Paper but doubted if the Minister should have all the recommended powers.

Lord Auckland compared the Government's policy of discouraging people from taking cars into London and the policy of increasing season ticket rates and suggested these policies were incompatible. He, too, touched on the difficulties of transport in Scotland.

Lord Merrivale thought the Chairman of the proposed Railway Board should be a highly qualified man of considerable experience and standing with extensive knowledge of railway operation. He also suggested that part-time members of the board should come from such Institutions as that of the Civil Engineers, Railway Signals Engineers, and Locomotive Engineers.

Lord Lindgren, himself a former railwayman, assured the House that it was not good for morale to be working in an industry always in the red, and subject to continued public criticism, and mentioned the expense which had been occasioned by the Government on re-appraisal after re-appraisal of the Modernisation Plan.

Competition from Pipelines

Lord Latham referred to pipelines as a new element of transport and suggested it would have profound effects on freight transport. He envisaged the supplanting of railways by pipelines, or at least a diminution of earning power of railway. He pointed out that not only can pipelines deal with liquids but also certain solids.

Parliamentary Secretary's Reply

Lord Chesham, Parliamentary Secretary, Ministry of Transport, replying, said, the railways' problems were so big and pressing that it was essential to have a single-minded authority running them as a national system. A strong board would also provide means and opportunity for adequate devolution of authority to those charged with day-to-day operation.

Open Forum at Halifax

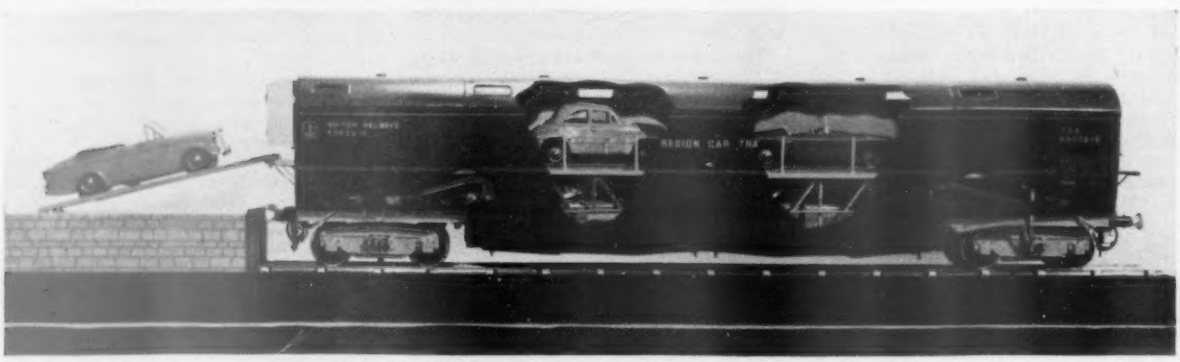
Over 400 people attended the open forum held on February 28 by the North Eastern Region of British Railways at Halifax in Yorkshire at which Mr. E. E. Cowell, Traffic Manager (West Riding), stated that the Region hoped to introduce its next inter-city diesel service by the end of this year. The service would encompass Leeds, Bradford, Halifax, Manchester (Victoria), and Liverpool Exchange. He promised an under-the-hour service between Halifax and Manchester and said there would also be improved services between Halifax and places like Leeds and Harrogate.

Improved Services

Services would be improved between the West Riding and Kings Cross to compete with the air service between Yeadon and London Airport.

Not well sited from the railway point of view, Halifax could not expect to get the same sort of service to London as, for instance, could Leeds. Nevertheless, it was hoped to introduce another through service from Halifax to Kings Cross next winter which would get passengers to London before noon and with a through carriage.

CAR TRANSPORTER IN THE EASTERN REGION



Model of the two-tier car transporter referred to editorially this week

Fares reductions and improved services on French Railways

French Railways Limited has announced that car-sleeper express fares can now be subject to a similar reduction to that which applies to ordinary passenger services. The resulting fares will be more advantageous when a passenger is travelling alone or when passengers are entitled to a reduction of 30 per cent or more. The supplement for the occupation of wagon-lits berths on the Boulogne – Lyon, and Paris – Avignon or Biarritz car-sleeper expresses have also been reduced. The facility for passengers to pay for tickets on the Boulogne–Lyon car-sleeper express by cheque at Boulogne–Maritime station in an emergency has been withdrawn but a " Bureau de Change " has been opened there.

The new evening rapide " Le Capitole," between Paris and Toulouse, will now be continued until June 27 from Paris, and until June 28 from Toulouse. A further concession is that from May 28 next the night service between London and Paris *via* Dover–Dunkerque will be made available to ordinary second-class passengers for the first time.

A new electric " Trans-Europ-Express " is to be introduced, this summer, between Paris and Milan. Commencing on July 1, this train will leave Paris at 13.15 in one direction, and Milan at 14.55 in the other, and will do the journey in eight hours.

Royal visit to Madras

The Queen visited the Integral Coach Factory at Madras on February 20, 1961, accompanied by Mr. M. Bhaktavatsalam, Home Minister of the Government of Madras. On arrival, she met Mr. Jagjivan Ram, Minister for Railways, and Mr. K. Swarup, Chief Administrative Officer of the factory. The Railway Minister then introduced other principal officers of the Southern Railway and the coach factory.

Mr. Swarup explained to Her Majesty the manufacturing processes in the factory. With the aid of a model he showed the main features of the integral coach. The Queen asked for further details of the anti-telescopic end and learned that this feature absorbs the full energy of an impact so that the ends buckle and passengers remain safe inside the coach.

Her Majesty was then driven in an open car around the factory, where she saw various processes and two completely furnished coaches.

She remarked on the modernity of the factory and observed that this may have resulted from the fact that it had been well-conceived and planned from the very start.

At the Workers' Colony, the Queen was welcomed by children with a song. She was then presented with a bouquet and Banaras stole by ladies of the Colony, who welcomed her in traditional Indian style.

Later, the Queen spoke with a young fitter, who also presented her with a bouquet.

The Railway Minister then presented Her Majesty with a small casket on behalf of the Indian Railways. The casket was a silver box carrying the Queen's personal insignia in gold. Two coaches were engraved on each side with the Indian Railways emblem on the front and that of the Integral Coach Factory on the back.

Before leaving, Her Majesty signed the Visitors' Book and observed: " The Duke was very much impressed with the factory when he visited it in 1959, and so am I. I wish to congratulate you on the achievements and wish you further successes."

BTC exhibits at Earls Court

One of the greatest attractions at the forthcoming Tenth Electrical Engineers' Exhibition, to be held at Earls Court, March 21-25, will be the British Transport Commission's Signals and Communications feature. The equipment displayed will be representative of standard apparatus used in modern installations which have been designed to reduce maintenance to a minimum.

The main feature will be two interlocking control panels and a model railway forming an inner and outer circle with two double junctions. The complete model will be controlled on the route-setting principle from an adjacent signal box, one junction being controlled by the conventional relay method and the other by an electronic system of interlocking, believed to be the first of its kind. This system is soon to be installed in Henley-on-Thames box, in the Western Region, for full-scale trials. Also displayed will be the signalling control panels, the track diagram, and a simplified form of train description and telephone equipment.

Other items will be an automatic level-crossing barrier, the first of which has recently been installed near Uttoxeter, a section of full-sized permanent way with electrically-controlled points, colour-light signals to demonstrate four-aspect signalling, an automatic-warning system demonstration panel with full-sized inductors on the permanent way, and a station platform with the latest types of lighting. Although most of the exhibits will be working equipment, operable by viewers, there will be numerous static exhibits such as various types of cables and also a display of immunisation of track circuits and lineside conductors from 25 kV. 50 c/s traction supply.

The following manufacturers have contributed to the display: Westinghouse Brake & Signal Co. Ltd., S.G.E. Signals Limited, A. E. I.G.R.S. Limited, Standard Telephones & Cables Limited, British Insulated Callender Cables Limited, Mullard Equipment Limited, Permali Limited, Pirelli General Cables Limited, Rotax Limited, M. L. Aviation Limited, Henry Williams Limited.

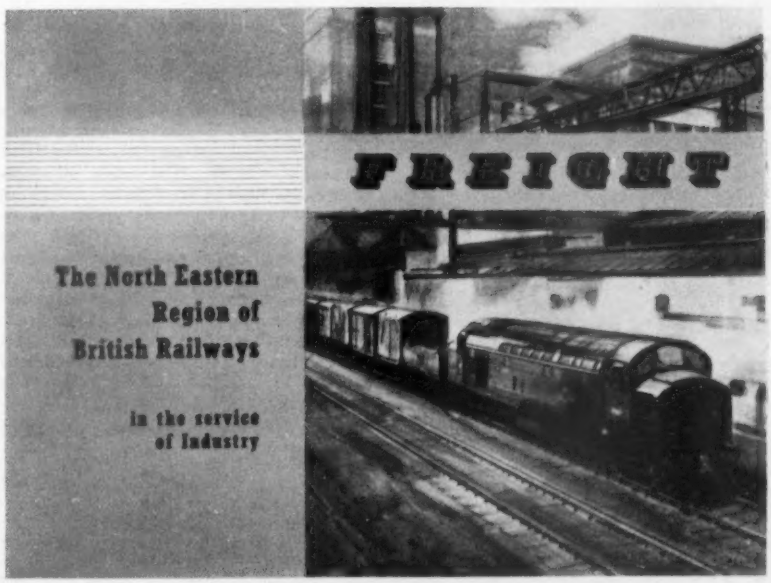
Travel Agents meet Eastern Region Officials

Fifty-seven Travel Agents, representing Agencies sponsored by the Liverpool Street and Kings Cross traffic areas of the Eastern Region of British Railways, attended a conference in London on March 1 and 2, under the chairmanship of Mr. H. Kinsey, District Commercial Officer, Liverpool Street, when they met Eastern Region officials. In spite of the bad weather in 1960, rail bookings by sponsored agencies, it was stated, rose compared with 1959, due, it was thought, to more first class travel on business purposes, to an increased readiness to pay supplementary fares on special services, and to a considerable increase in first class sleeper bookings.

Improved service

" The Car Sleeper Limited," from a total summer capacity each way of 520 cars in 1955 had been increased to over 5,166 during

SELLING FREIGHT IN THE NORTH EASTERN REGION



Cover of illustrated brochure produced by the North Eastern Region of British Railways to sell freight services (editorial this week refers)

1960. In addition, a new day service, "The Anglo-Scottish Car Carrier," was introduced between London, Newcastle and Edinburgh in 1960, with a summer capacity in each direction of 3,240 cars. Still more car accommodation was needed to cope with the demand, during the summer season, and a new covered two-tier car transporter was being developed which would be introduced as soon as the vehicles were ready. A special invitation was given to all agents to visit the exhibition to be held at the Car Loading Bay, Cheney Road, Kings Cross during the week commencing March 13, to see a model of the new transporter and a demonstration of car loading.

The question was raised as to why agents were not permitted to issue "off-peak" tickets. They were told that this was the first application which had been received, and if there was a demand for such tickets they would be issued immediately.

British Railways modernisation exhibition

British Railways, North Eastern Region, in conjunction with the University of Leeds Adult Education Centre, Middlesbrough, are holding an exhibition of achievements and progress under the Railway Modernisation Plan and in particular its significance to Tees-side, until March 25. The exhibition, at the Adult Education Centre, Middlesbrough, was opened by Mr. K. A. Kindon, Traffic Manager (Tees-side) on Monday, March 13, and is open to the public at the following times: Weekdays, 10 a.m.-1 p.m. and 2.15 p.m. -5 p.m.; Saturdays, 10 a.m.-12.30 p.m.; Evenings, 6 p.m.-10 p.m. on Tuesday, March 21 and Thursday March 23.

The aim of the Railway Modernisation Plan will be described by texts and diagrams.

U.T.A. PUBLICITY

A humorous and colourful poster advertising passenger facilities

HUNGARIAN STAFF TRAINING

A class on signalling at Szeged railways technical college

Models and photographs of multi-unit diesel trains and diesel-electric locomotives, and for interest and comparison, models of steam trains will be exhibited. There will also be photographs of Darlington Diesel Depot and the new motive power depot at Thornaby. The working of modern marshalling yards, goods stations, the automatic warning system, and modern methods now used to maintain the track will be illustrated. In addition there will be photographs of items of railway historical interest and a display featuring careers available on British Railways.

The exhibition will be supported by public lectures and films for which admission tickets will be required, obtainable at the Adult Education Centre. The last of these lectures will be held on Monday, March 20, commencing at 7.15 p.m. On Wednesday, March 22, commencing at 4.30 p.m., three short films made by the British Transport Commission will be shown. This programme will run continuously until 9 p.m. A second film show will be held on Friday, March 24, commencing at 7.15 p.m., when six short British Transport Commission films will be shown.

"VISITOR'S LONDON" POSTER MAP

London Transport's "Visitor's Bus Routes" map, first issued two years ago as a pocket folder, is being supplemented by a similar but more detailed "Visitor's London" poster map. Like the pocket map, the poster shows 15 key bus routes all chosen to make up a simple network for sightseeing, and covering inner London from Earls Court to Whitechapel. The routes are: 2, 3, 6, 8, 9, 11, 14, 22, 24, 25, 38, 73, 74, 77, and 109. Each has its own separate colour and code indication. The poster also shows the Underground lines and stations in the area. To avoid confusion with the bus route codes, Underground lines are shown in black. A map square index to 106 places of interest to visitors completes the poster and gives quick reference to the information printed on the map.

B.I.C.C. EXHIBIT AT EARLS COURT

British Insulated Callender's Cables Ltd. at the Electrical Engineers Exhibition, to be held from March 21-25, will include a display of power cables. Among those shown will be a 25 kV oil-filled concentric O.S.A. cable with aluminium conductors, as supplied for British Railways electrification scheme. Also to be on view are examples of EETEE isolators and switches, used in overhead systems of railway electrification.

ROCOL MOLYSPEED PRODUCTS

Rocol Limited is now marketing its molybdenum disulphide oil additive in 4-oz. polythene dispenser bottles. The company's molyspeed grease is now available in 8-oz. plastic tubes.

BOLTON GATE CO., EXPANSION

To meet demands the Bolton Gate Co. Ltd., manufacturer of collapsible gates and doors, is doubling the production area of its works. Production facilities are also being expanded and the introduction of improved methods will speed up output.

Bridge for Colchester line "dive under".

DESOUTTER PRICE REDUCTION

Desoutter Bros. Limited announce reductions in the prices of many of their pneumatic screwdrivers.

NEW MIDLAND DAGENITE DEPOT.

Pritchett & Gold & E.P.S. Co. Ltd. has transferred its Birmingham depot to: 234, Stratford Road, Shirley, Solihull, Warwicks.

Modernisation at Colchester

The Eastern Region's rail speed-up plans for the East Anglian main line took another step forward this week when two 100-ft. girders for a new bridge over the Colchester "dive-under" line arrived at the site. Believed to be the longest ever made in the London area, the 40-ton girders were brought from the Millwall works of the bridge builders —Joseph Westwood & Co. Ltd.—by road and rail.

The bridge is one of the chief features in an extensive programme of trackwork being carried out in connection with the complete reconstruction of Colchester Station. When work is fully completed—sometime in 1962—main-line trains in the area will be able to reach speeds of up to 90 m.p.h. The bridge will carry trains on the Norwich main line over the new 1,200-yd.-long dive-under line—which is being specially constructed to serve Clacton-bound trains.

Construction

This will be a heavily-skewed two-track bridge, consisting of two welded steel main girders and a deck of steel joists encased in concrete. The main girders have a span of 95 ft. and an overall length of 100 ft. They are placed on 29-ft. centres.

To facilitate the construction of the abutments and wing walls, the District Engineer for the area has already placed way-beams over the locations of the abutments, enabling the contractors, the Cementation Co. Ltd., to excavate in a trench under traffic. The concrete wing walls and abutments—each abutment supported by 40 piles—will then be built, also under traffic.

A temporary staging will be erected alongside the site of the bridge and the main girders and deck assembled there. When all is ready, the entire deck, ready ballasted and weighing approximately 540 tons, will be rolled into position. This operation is expected to take place in May of this year.

CONTRACTS & TENDERS

The British Transport Commission, South Wales Docks, have placed the following contracts:—

Stothert & Pitt Limited: supply, erection and testing of 15/7½-ton electric crane at Queen Alexandra Dock, Cardiff

Joseph Westwood & Co. Ltd.: supply of four grabs for use with 10-ton cranes at South Dock, Newport.

British Railways, Eastern Region, has placed the following contracts:

Clark & Fenn Limited: repairs to reinforced concrete superstructure of overbridge between Grimsby Docks and New Clee

Clark & Fenn Limited: repairs to reinforced concrete superstructures of two overbridges and one underline bridge between Althorpe and Appleby

Connaught Construction (Send) Limited: supply and installation of car park lighting, medium voltage distribution and lighting and battery charging points in Colchester Station carriage cleaning sidings

Wellerman Bros. Ltd.: stabilisation of slip in embankment north of Bardney Station

Bovis Limited: provision of building to accommodate traffic accounting staff at Cambridge

Bovis Limited: provision of building to accommodate traffic accounting staff at Lincoln.

British Railways, London Midland Region, has placed the following contracts:

R. C. Tann (Builders) Limited: construction of club building for staff association, at Wellingborough

Thos. Fletcher & Co. Ltd.: reconstruction of bridge No. 35 on the Welwyn/Dunstable branch

Braithwaite Foundations & Construction Limited: piling for bridge No. 84 on the Bushbury/Stafford line, and station buildings and yardmaster's office in connection with the reconstruction of Stafford Station

George A. Poole Limited: yardmaster's office and amenities

Wilson Lovatt & Sons Ltd.: addendum for additional earthworks and services, new police and capstanman's buildings at Freight Terminal, Stoke-on-Trent

Industrial Engineering Limited: repairs to roof at Saltley road motor depot.

Steel, Peech & Tozer Limited, a branch of the United Steel Co. Ltd. have awarded a contract worth nearly £600,000 to Tarmac Civil Engineering Limited. This contract is for the first three phases of civil engineering works valued at about £2 million, part of the Steel, Peech Electric Arc Reorganisation programme (S.P.E.A.R.).

Tarmac Civil Engineering Limited, a member of the Tarmac Group, has been awarded an extension of its existing contract with Guest, Keen & Nettlefolds (South Wales) Limited. The additional work, worth about £190,000, which is for building and civil engineering in the blast furnace area, forms part of a development scheme.

BOARD OF TRADE

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Australia:

3 or alternatively 5 diesel-electric locomotives for 4-ft. 8½-in. gauge railway with all necessary equipment and accessories. The locomotives are to be of the double bogie type, with three axles per bogie. The locomotives must be suitable for operation either singly or in multiple, and shall be constructed to permit operation from one end.

The issuing authority is the Office of the Secretary, Commonwealth Government Railways, 623 Collins Street, Melbourne, C.1, to which bids should be sent. The tender No. is ME.1424. The closing date is April 18, 1961. The Board of Trade reference is ESB/8212/61.

From Sudan:

1 automatic flash butt welder with hand wheel pre-heater for locomotive, carriage, and wagon components and general purpose welding.

The issuing authority is the office of the Controller of Stores, Sudan Railways, Atbara, to which bids should be sent. The tender No. is 2336. The closing date is April 12, 1961. The Board of Trade reference is ESB/8131/61. No further information is available at the Board of Trade.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

NOTES AND NEWS

Mond Nickel Co. Ltd. The Mond Nickel Co. Ltd., from February 28, changed its name to the International Nickel Co. (Mond), Ltd.

Engineering exhibition. The Engineering, Marine, Welding & Nuclear Energy Exhibition will be held at Olympia, London, from April 20 to May 4.

BICC Ipswich branch. The Ipswich branch of British Insulated Callender's Cables Limited has moved to 1, Benezet Street, Ipswich. Telephone : Ipswich 57265.

C.A.V. Limited at Olympia. C.A.V. Limited will show a selection of diesel fuel injection equipment, turbochargers, and electrical equipment for industrial power plant and marine duties, and electrical-mechanical devices for nuclear energy applications. Many of the exhibits are sectioned to show their construction and method of working.

Dowty Rotol hydraulic equipment. A Hydel solenoid-operated valve, and a power pack including a Vardel pump, will be among the exhibits of the Dowty Group at the forthcoming Engineering, Marine, Welding & Nuclear Energy Exhibition, at Olympia.

Bernard Wardle at International Plastics exhibition. Bernard Wardle (Everflex) Limited, manufacturers of p.v.c.-coated fabrics, are to exhibit fabrics suitable for upholstery, panelling, hooding, and wall covering at the International Plastics Exhibition & Convention to be held at Olympia from June 21–July 1.

Stainless steel exhibition. British stainless steel products are on exhibition at the Mayfairia Rooms, Marble Arch, London, W.1, until May 4. The exhibition was opened by Mr. Paul Reilly, Director of the Council of Industrial Design. The exhibition was sponsored by the Stainless Steel Manufacturers' Association of Great Britain.

New Britool company. Britool Limited has formed a new company to promote sales in Canada named Britool (Canada) Limited, with headquarters in Toronto, and branches in Montreal and Vancouver. Taylor, Law & Cartwright Limited continues to act as sales agents from these three points, and also Edmonton and Winnipeg.

English Electric at Olympia. The main exhibit of the English Electric Co. Ltd., at the forthcoming engineering exhibition at Olympia, will be a British Railways Type "1" diesel-electric locomotive. Other exhibits include a new range of rotary electric actuators, for the automatic control of valves, and a full range of arc-welding equipment.

Thos. Ward at Olympia. Thos. W. Ward Limited will display selections from the Ficep range of Shears and Bending Machines, the Gosmeta range of Presses, and a typical unit from the Oxford range of arc welding transformers, at the Engineering, Marine, Welding & Nuclear Exhibition at Olympia from April 20-May 4.

Orders for A.E.C. products. Contracts for 550 diesel power units for customers in Britain and in Canada, Finland and elsewhere are included in the January order book of A.E.C. Limited. The company more recently has received orders for passenger vehicle chassis from Angola, South Africa, Turkey, Uganda and Uruguay.

Diesel Engineers & Users Association annual luncheon. The annual luncheon of the Diesel Engineers & Users Association will be held on April 13, 1961, at the Connaught Rooms. The President, Mr. W. A. Parker, will be in the chair, and the principal guest will be Professor Owen A. Saunders, President of the Institution of Mechanical Engineers.

The Duke of Edinburgh's lecture. H.R.H. The Duke or Edinburgh will give the seventh Graham Clark lecture to the three senior engineering institutions at the Institution of Civil Engineers on April 13. The title has not been finally decided. Admission will be by ticket only.

Electrical engineers exhibition. A contactor cubicle and master controller, for British Railways L.M.R. Type "4" diesel-electric locomotives, will be on the stand of Allen West & Co. Ltd., at the Electrical Engineers (A.S.E.E.) Exhibition, at Earls Court, March 21-25.

Eastern Region plastic relay room. The Eastern Region have erected a new signal relay room of shining white plastic, the first of its kind in this country, at Stanford-le-Hope, on the London Tilbury & Southend Line.

Budd Company technical assistance for Mexican company. The Budd Company of Philadelphia has announced the formation of a technical assistance agreement with a new Mexican company, Auto-Manufacturers S.A. The new concern, organised by a group in Mexico City, is building a large plant representing an investment equivalent to $1·2 million for foundry and machining facilities.

Desoutter group at Olympia. On the Desoutter Group stand will be the first participation, at an exhibition, of the new company Carter Stevens (Automation) Limited. Pneumatic cylinders, control valves, and other items of control gear will be shown from Lang Pneumatic Limited, another member of the group. There also will be a complete range of Desoutter pneumatic and electric power tools and multiple units for semi-automatic assembly.

Hymatic Engineering at Elst. The Hymatic Engineering Co. Ltd., which is taking part in the International Exhibition of Railway Track Maintenance Equipment, at Elst, Holland, March 20-25, will show the Hydrovane mobile compressor "98P100" operating tie tampers for ballast ramming, spike drivers, rail drills, nut runners, riveters and concrete breakers. The display will be provided by the demonstration van illustrated on this page.

Road safety contest. For the third time, the Middlesbrough Commercial Superintendent's District (North Eastern Region, British Railways) has won the silver cup presented in 1956 by the Company of Veteran Motorists to the Region for annual competition in connection with the "Safety on the Roads" campaign. The cup is awarded to the district showing the highest percentage decrease in blameworthy accidents.

Withdrawal of freight train service. British Railways, Eastern Region, announces that the freight train service has been withdrawn from Mardock Station, situated on the St. Margaret's-Buntingford branch line. Existing collection and delivery services for freight sundries will continue to operate in the area. Facilities for freight traffic in full wagon

Hymatic van used to display Hydrovane mobile compressors

loads will be available at Ware Station. Mardock Station will continue to be served by passenger trains.

Refrigerated container. Cape Insulation & Asbestos Products Limited will exhibit a working model of a refrigerated container at the International Refrigeration Exhibition, opening at Earls Court on April 11. The prototype was built by Duramin Engineering Limited and is insulated with "Rocksil."

Costa Rica Railway Co. Ltd. For the year to June 30, 1960, gross income was £108,419 Compared with £101,825 for the previous year. After provision for debentures and administration expenses totalling £61,552 (£56,717) there was a balance of £46,867 (£45,108). Sinking fund again took £3,000 and provision for income tax was £2,710, leaving a balance of £41,157, which was added to the balance of provision for second debenture interest.

Report on the Census of Production for 1958. Two more parts of the "Report on the Census of Production for 1958" have been published as follows: Part 6, Salt and Miscellaneous Non-Metalliferous Mining and Quarrying; price 1s. 9d. (postage 2d. extra). Part 67, Railway Carriages and Wagons, and Trams; price 2s. (postage 2d. extra). Copies may be obtained from H.M. Stationery Office at York House, Kingsway, London, W.C.2, and branches, or through booksellers.

Institute of Transport Tees-side Section annual dinner. The annual dinner of the Tees-side Section of the Institute of Transport took place at the Highfield Hotel, Middlesbrough, on March 3, 1961. The President of the Institute, Mr. K. W. C. Grand, responded to the toast "The Institute of Transport" proposed by Mr. W. McClelland. The toast "Our Guests" was proposed by Mr. W. V. Golding, and the response was given by Mr. S. Hirst, formerly Director of Education, Middlesbrough. Mr. L. N. Brocklehurst, Chairman of the Section, presided.

Metals exhibition. The International Nickel Co. (Mond) Ltd., is presenting an exhibition at the Engineers' Club, Manchester, designed to interest all concerned with engineering problems involving the use of metals. The main emphasis will be on the properties of nickel-containing materials and the platinum metals. Each day lectures will be given by members of the company's Development Research Department, and there will be technical discussions, both at the lectures and in the exhibition rooms. A programme of the lectures and film showings can be obtained from the company at 20 Albert Embankment, London, S.E.11.

Bristol Siddeley exhibits at Olympia. The exhibits of Bristol Siddeley at the forthcoming Engineering, Marine, Welding & Nuclear Energy Exhibition will include a 3-Mw mobile generator and examples of the "MD" range of Bristol Siddeley Maybach engines. Among these will be the "MD330," "MD655," and "MD870" engines built at the company's Ansty, Coventry, works for British Railways "D800" class and British Railways diesel-hydraulic Type "3" locomotives under construction by Beyer Peacock (Hymek) Limited.

Westinghouse to introduce new size of Trinistors. In addition to the new range of Trinistors, with current ratings of 16 amperes and volting ratings of 25-400 volts, which the Westinghouse Brake & Signal Co. Ltd. has introduced to supplement the existing 25 ampere range, both larger and smaller sizes will be introduced later in the year.

Institute of Transport Scottish Section annual dinner. The annual dinner of the Scottish Section of the Institute of Transport took place at the Central Hotel, Glasgow, on March 2, 1961. The President of the Institute, Mr. K. W. C. Grand, proposed the toast "The City of Glasgow" and the Lord Provost of Glasgow, Mrs. Jean Roberts, J.P., responded. The toast "Our Guests" was proposed by Mr. James Amos, and the response was given by Col. D. H. Cameron of Lochiel, T.D., Chairman, Scottish Area Board, British Transport Commission. Mr. J. M. Fleming, Chairman of the Section, presided.

Vulcan Foundry Limited. Group profit, 1960, £574,209 (£435,784) and dividend 5 per cent (same). Fixed assets £1,908,627 (£1,816,413), current assets £5,920,768 (£4,523,667) and liabilities £3,601,769 (£2,897,220). Parent loan account, liability, £1,345,000 (£470,000). Commitments £47,000 (£60,000). Orders on books, states the Chairman, Lord Nelson, should ensure another satisfactory year in 1961, but the longer-term prospects in the locomotive industry are by no means clear owing to delay in settling the future programme of the British Transport Commission. In the export market there is little change in the position reported a year ago, except that foreign competition has further intensified.

Central Wagon Co. Ltd. The Central Wagon Company is reasonably assured of full-time working throughout 1961, states the Chairman, Mr. F. T. Hanson. The group is fully employed at present, with some departments working overtime. Moreover, the British Transport Commission has placed orders for new rolling stock. No vehicles were built for British Railways during the year to September 30, 1960. The year-end group balance-sheet shows investments of £373,745 (£393,120), with a market value of £376,974 (£396,595), and current assets of £1,571,377 (£1,594,181), against current liabilities of £321,888 (£271,030).

Pipeline from Thames to Mersey. The pipeline system from Canvey Island to Denham, proposed by Trunk Pipelines Limited, is part of a plan to build a 300-mile pipeline from Denham to the Mersey. The sections from Denham to Birmingham and from the Mersey to Birmingham were not the subject of the Trunk Pipelines Bill, and would be built entirely on the property of British Waterways. If the agreement of the British Transport Commission was obtained further statutory powers might not be necessary. The system at present envisaged is for the transport of lighter petroleum products or liquefied gases but could be extended for other pumpable commodities. Trunk Pipelines Limited is a consortium of finance consultancy, and construction interests led by Close Brothers, the London investment bankers.

Keith Blackman at Olympia. A selection of fan equipment in general and marine fan equipment in particular will be exhibited by Keith Blackman Limited at the Engineering, Marine, Welding & Nuclear Exhibition at Olympia on April 20-May 4, and will include:—a 23 in. Marine type axial fan with d.c. totally enclosed motor and eight-bladed adjustable pitch impeller; a 16 in. Air Circulator of the bulkhead fixing type; a 22½ in. AR type marine centrifugal fan with direct drive a.c. motor and aluminium universal casing; a 19 in. AFX fan with indirect drive motor mounted external to the casing and driving through vee-ropes; an APA type Propeller Fan and an "Aristocrat" Centrifugal Fan; a display illustrating the working principle of the "Tornado" Bifurcated Fan; a working model of the Type PS Elevator; a "Heat Throw" unit space heater, and a K.B. industrial gas display.

Motorway over disused railway. Part of the 30-mile Durham motorway will run on six miles of a disused branch railway to bring the A.1, the Great North Road, up-to-date.

Diesel services regain passengers. The introduction of diesel services has regained for British Railways between 50 and 200 per cent of passengers, depending on the area. The introduction, in January, of the Trans-Pennine Express had increased passenger traffic in that area 100 per cent. To mark the last phase of the North-East Lancashire diesel scheme, started in 1958, an improved train service was introduced, on March 6, between Manchester, Accrington, Burnley, Colne, and Skipton, and between Accrington and Preston. The two-vehicle trains seat 115

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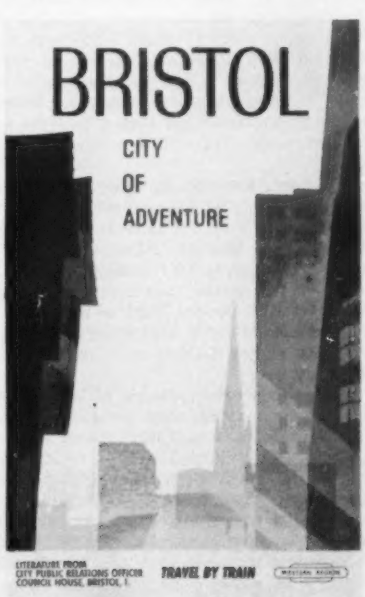

New Western Region, British Railways, poster for Bristol

passengers, and, to give good acceleration on gradients, both vehicles are powered. It is expected that all suburban trains in Lancashire and Cheshire will be diesel or electric within the next two years. This will involve extension of diesel services to the Fylde coast, to the Manchester, Bolton, Wigan and Southport line, and the Liverpool, Manchester, Leeds route through Todmorden.

Railway Stock Market

More cautious views have gained ground in stock markets, and share prices lost part of the good gains recorded at the beginning of last week when sentiment was under the influence of the benefits to British exporters expected to arise from the revaluation of the West German mark. The reason for the caution was the weakness which developed in the £, though this was regarded as probably a temporary development due to currency speculators. On the other hand, hopes of tax reductions in the Budget are now less widely held, and there is talk of a possible increase in the bank rate, but it is recognised that much will depend on the trend of the £ in the foreign exchange market in the next few weeks.

There were no outstanding movements in foreign rails, where very little business was passing. Antofagasta ordinary stock kept at 16, though the preference stock receded from 36¼ to 35¼. United of Havana second income stock was again 6¼, San Paulo Railway 3s. units strengthened from 1s. 3¾d. to 1s. 6¼d. and Brazil Railway Bonds were again quoted at 4⅞.

International of Central America common shares were $23½, compared with $24½ a week ago, and the preferred came back from $114½ to $111½. Costa Rica ordinary stock has been maintained at 41¼, Chilean Northern first debentures at 51½ and Paraguay Central debentures at 17½. Guayaquil & Quito assented bonds marked 51½. Mexican Central "A" bearer debentures improved fractionally to 60½.

Canadian Pacifics moved daily with the trend of Wall Street markets, but at $41⅜ were maintained as compared with a week ago; the 4 per cent preference stock firmed up to 59 and the 4 per cent debentures remained at 60. White Pass shares kept at $10½.

Nyasaland Railways shares were unaffected by news from the Commonwealth conference, being 10s. 6d. the same as a week ago. Midland of Western Australia ordinary stock was again quoted at 6½, and the £1 units of the second debentures firmed up from 5s. 4½d. to 6s. West of India Portuguese capital stock kept its rise to 117½, and Barsi Light Railway stock remained at 15.

Movements among shares of locomotive building and engineering companies were generally small, though Birmingham Wagon declined further from 21s. 10½d. to 20s. 9d. G. D. Peters kept at 20s., but North British Loco. rallied from 6s. to 7s. 4½d. Gloucester Wagon 10s. shares were quoted at par, and Wagon Repairs 5s. shares 19s. 6d., both virtually the same as a week ago, but Charles Roberts 5s. shares came back from 9s. 3d. to 8s. 3d. Beyer Peacock 5s. shares were firmer at 7s. 1½d.

Westinghouse Brake have been maintained at 40s. 6d. A feature was provided by a further strong advance from 31s. 6d. a week ago in G.E.C. to 39s. 6d. on the view that the internal reorganisation expected to be put into force by the new chairman will raise earning power considerably in the years ahead. English Electric were also prominently strong with a further rise on balance from 37s. 9d. to 40s. 6d. and A.E.I. rose afresh on balance from 44s. to 48s. 6d., the maintained dividend being in accordance with expectations, and the profits, although lower, were regarded as a satisfactory achievement in a difficult year. Crompton Parkinson 5s. shares were higher at close on 14s. and Mather & Platt firmer at 46s. 9d.xd. Pollard Bearing 4s. shares strengthened to 38s. in front of the dividend announcement. Ransome & Marles 5s. shares were 22s.xd., compared with 21s. 6d. Tube Investments changed hands around 80s., and Leyland Motors were 84s. 7½d., while Broom & Wade 5s. shares have been firm at 27s. Pressed Steel 5s. shares were 32s. 6d. and Dowty Group 10s. shares 23s. 9d. Ruston & Hornsby moved from 27s. 9d. to 30s.

Forthcoming Meetings

March 17 (*Fri.*). The Institute of Transport, Tees-side Section, at the Cleveland Scientific & Technical Institution, Middlesbrough, at 6.30 p.m. "Unorthodox transport systems—do they deserve closer consideration?" Mr. C. F. Klapper.

March 18 (*Sat.*). The Permanent Way Institution, East Anglia Section, at Ipswich, at 2.15 p.m. "Developments in railway weed control," Mr. R. Howarth.

March 18 (*Sat.*). The Railway & Canal Historical Society, visit to Canterbury & Whitstable Railway.

March 18 (*Sat.*). The Institute of Transport, Southern Section, at the Grand Hotel, Lyndhurst, at 6.15 p.m. Annual Dinner and Dance, and visit of Sir Gilmour Jenkins, Past-President.

March 20 (*Mon.*). The Permanent Way Institution, London Section, at 222, Marylebone Road, N.W.1, at 6.30 p.m. "Eastern Region modernisation," Mr. P. W. Rosindell.

March 21 (*Tue.*). The Institution of Civil Engineers, joint meeting with Société des Ingenieurs Civils de France, at Great George Street, Westminster, S.W.1, at 5.30 p.m. "The work of the Channel Tunnel Study Group," Mr. J. M. Bruckshaw, Mr. J. Goguel, Mr. H. J. B. Harding and Mr. R. Malcor.

March 21 (*Tue.*). The Institution of Electrical Engineers, Measurement & Control Section, at Savoy Place, London, W.C.2, at 5.30 p.m. Discussion: "Self-adaptive control systems."

March 21 (*Tue.*). The Industrial Transport Association, London Division, at the Royal Society of Arts, John Adam Street, Strand, London, W.C.2. Annual General Meeting.

March 21 (*Tue.*). The Institution of Locomotive Engineers, at 1 Birdcage Walk, S.W.1, at 5.30 p.m. "Cooling equipment for diesel locomotives," Mr. T. Rudge, and Mr. M. Forbes.

March 21 (*Tue.*). The Institute of Transport, Humberside Section, at the George Hotel, Hull, at 7 p.m. Informal dinner and film display.

March 21 (*Tue.*). The Institute of Transport, North Western Section, at the Gas Service Centre, Manchester, at 6.15 p.m. "North Western electrification project," Mr. David Blee.

March 21 (*Tue.*). The Institute of Transport, Metropolitan Graduate & Student Society, at 80 Portland Place, W.1, at 5.45 p.m. "The tyre industry and transport," Mr. F. E. H. Palmer.

March 22 (*Wed.*). The Railway Students Association, at the London School of Economics & Political Science, Houghton Street, Aldwych, W.C.2, at 6.15 p.m. "Competitive freight operation," Mr. L. W. Ibbotson.

March 22 (*Wed.*). The British Railways, Southern Region, Lecture & Debating Society, at the Chapter House, St. Thomas' Street, S.E.1, at 6 p.m. Annual General Meeting, and reading of prize essay.

March 22 (*Wed.*). The Institution of Mechanical Engineers, at 1 Birdcage Walk, Westminster, London, S.W.1, at 6 p.m. Ordinary meeting: James Clayton Lecture, "The application of mechanical and biological knowledge in engineering," Sir Frederic Bartlett.

March 23 (*Thu.*). The Permanent Way Institution, Nottingham & Derby Section, at the Midland Hotel, Derby, at 6.30 p.m. "The track circuit," Mr. H. F. Vercoe.

March 23 (*Thu.*). The Institution of Railway Signal Engineers, York Section, at the Signalling School, Toft Green, York, at 5.30 p.m. "Electrification and the signal engineer," Mr. F. W. Young.

March 23 (*Thu.*). The Institution of Railway Signal Engineers, Manchester Section, at Hunts Bank, at 6 p.m. "Experience with the British Railways standard electrification system, with particular reference to signalling and telecommunications," Mr. A. W. Woodbridge.

March 24 (*Fri.*). The Railway Students Association, at the London School of Economics & Political Science, Houghton Street, Aldwych, W.C.2, at 6.15 p.m. Annual Dinner and Dance at the School.

March 24 (*Fri.*). The Institute of Transport, at the Dorchester Hotel, Park Lane, W.1, at 6.45 p.m. Annual Dinner.

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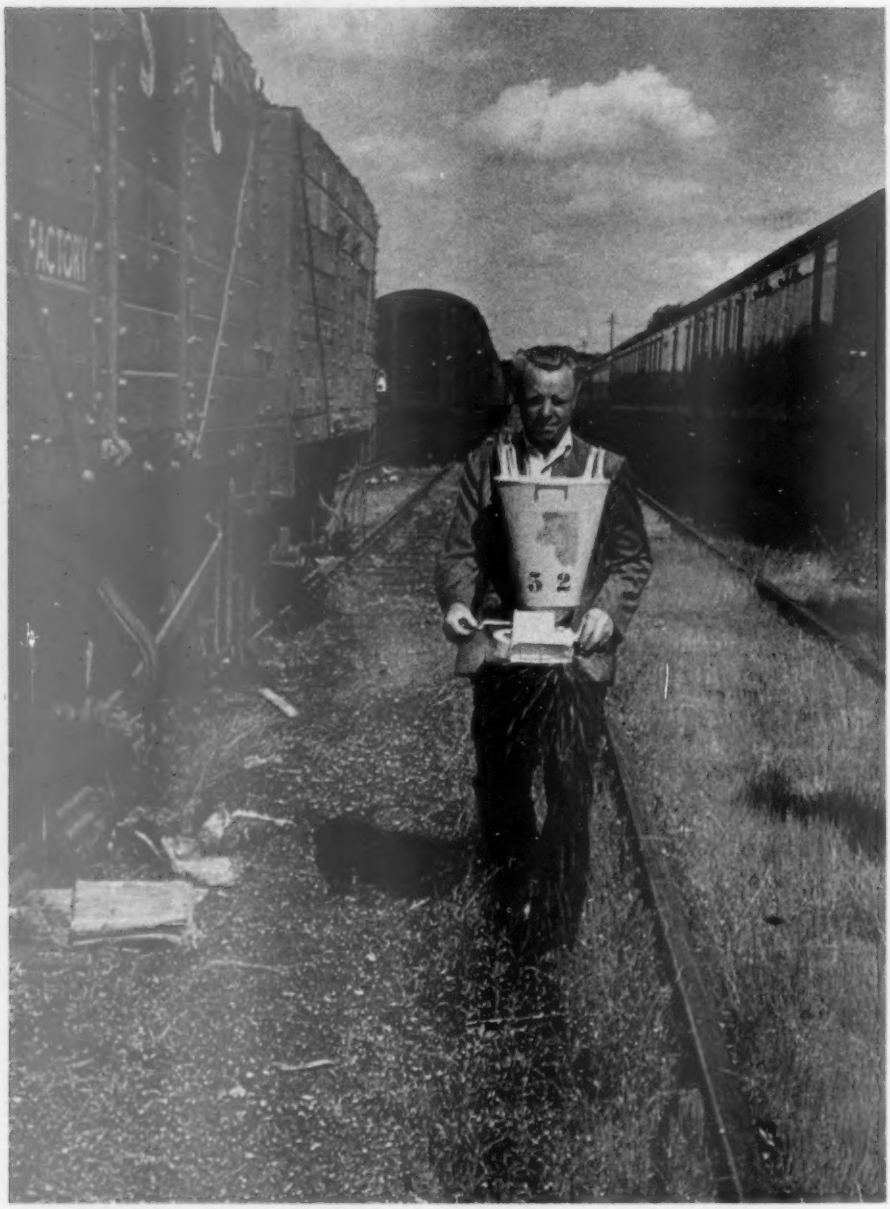

Illustration shows treatment of Sproughton Sidings, Ipswich. *Photo, by courtesy of Chief Civil Engineer, Eastern Region, British Railways.*

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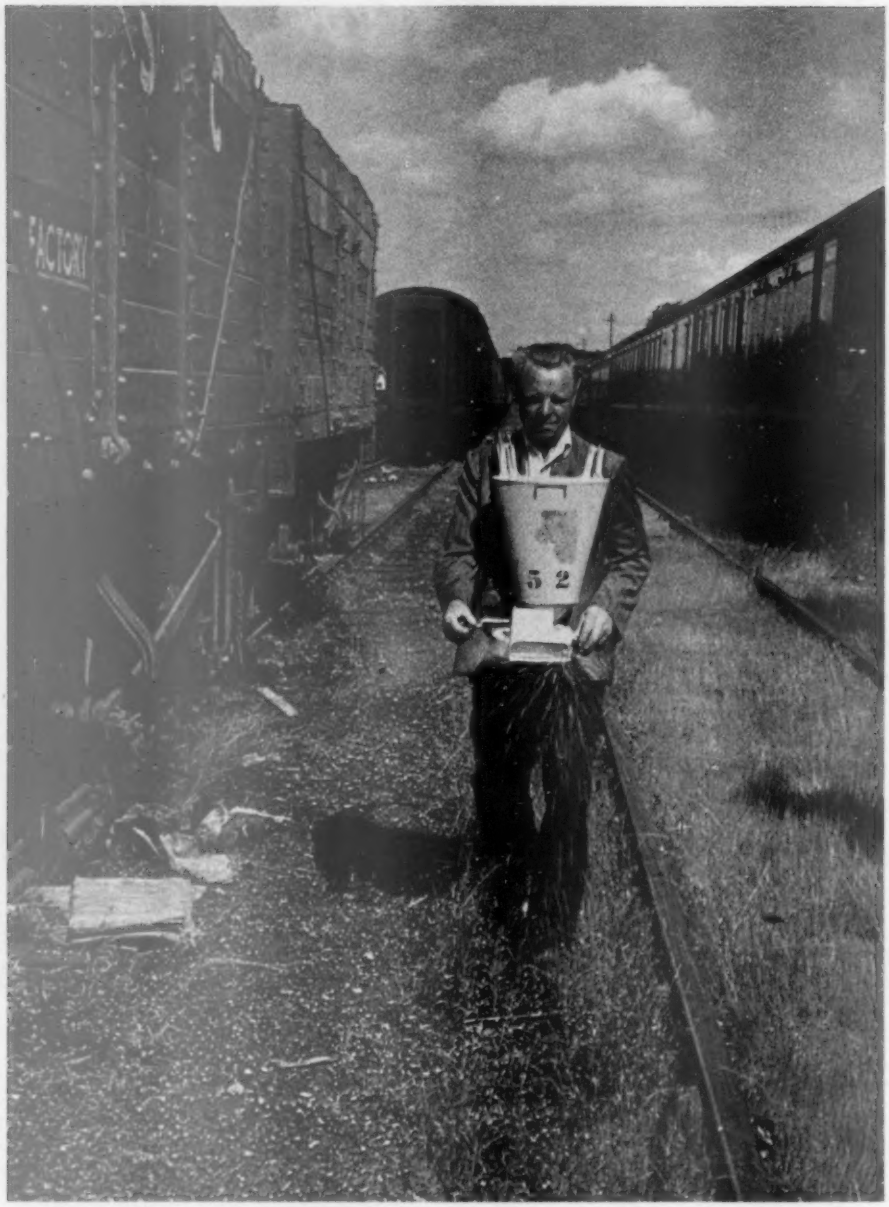

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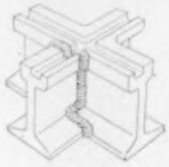

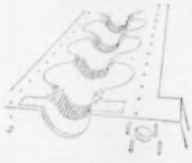

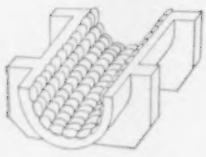

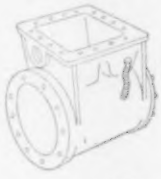

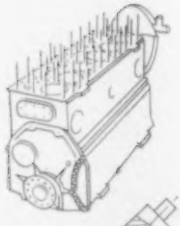

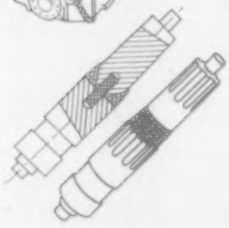

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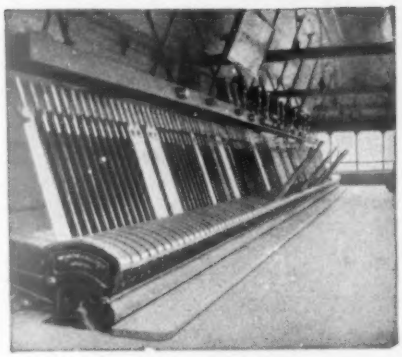

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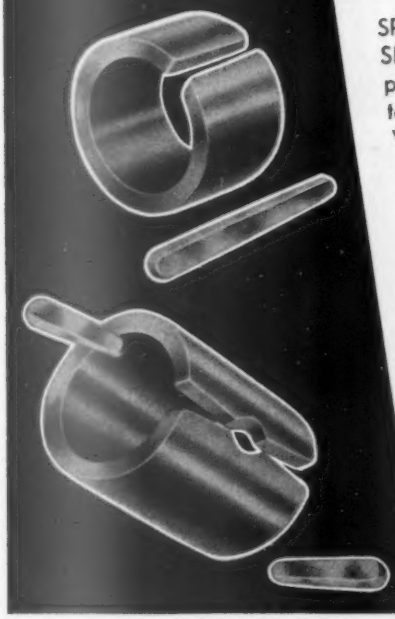

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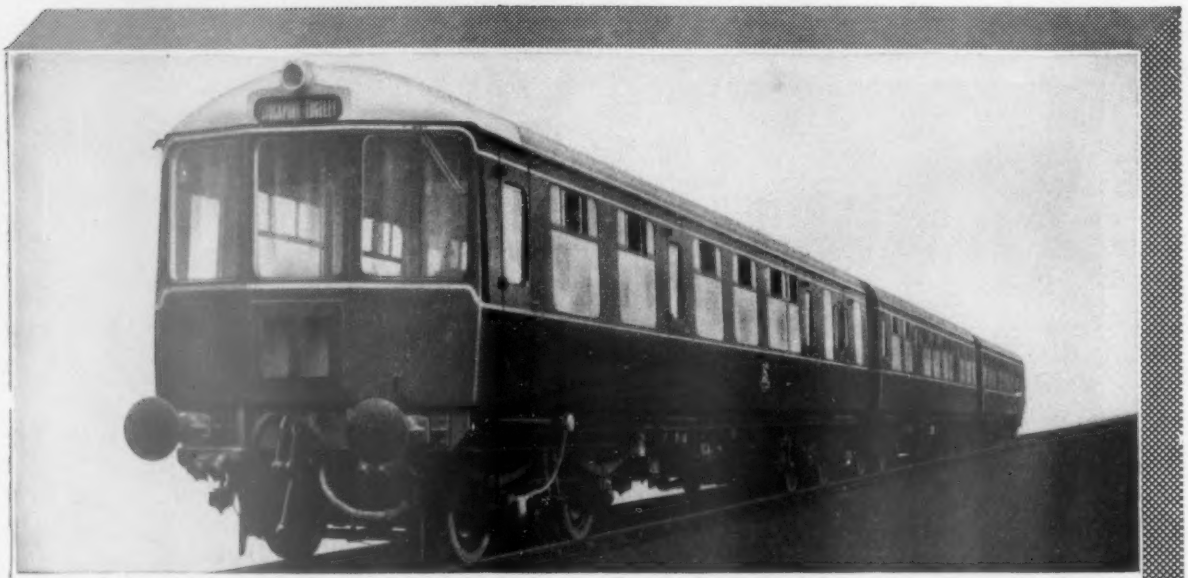

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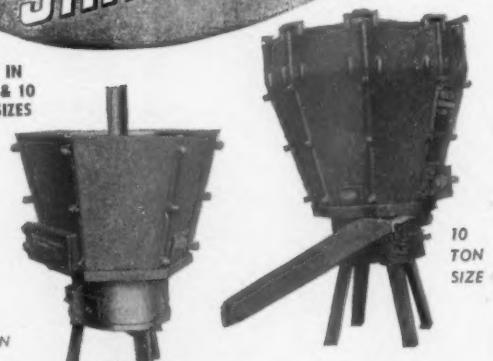

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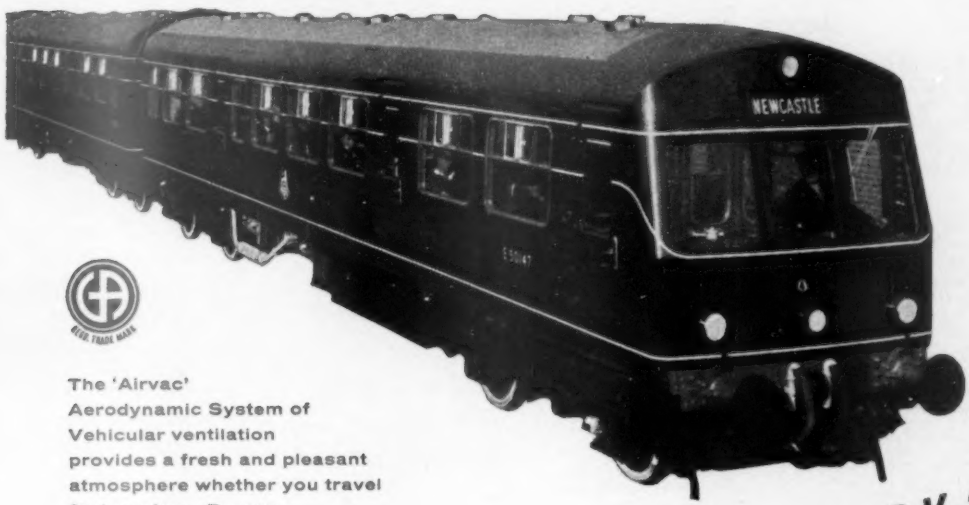

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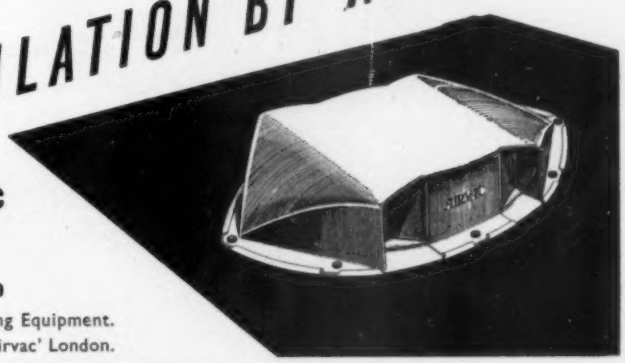

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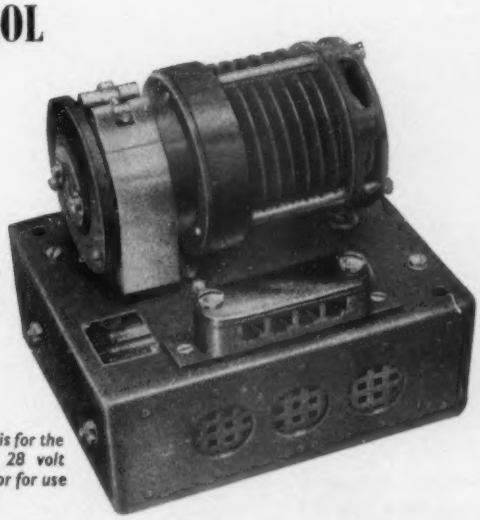

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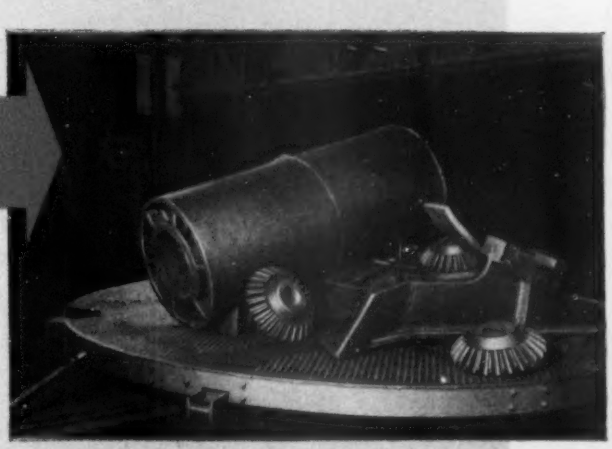

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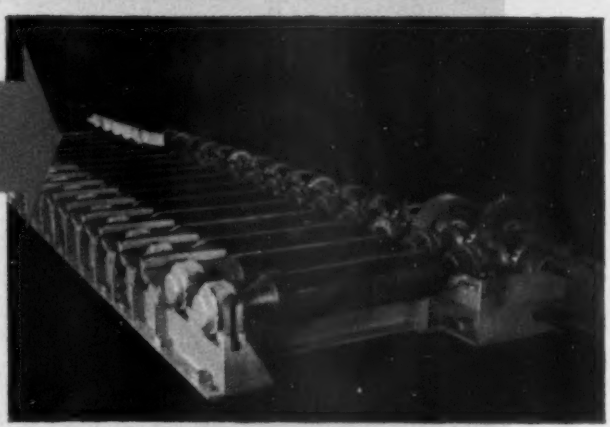

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